plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

APRIL · 1961

PLATING MAGAZINE

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Milwaukee Metal Finishing Exhibit

Tentative Program—AES 48th Annual Convention (Boston)

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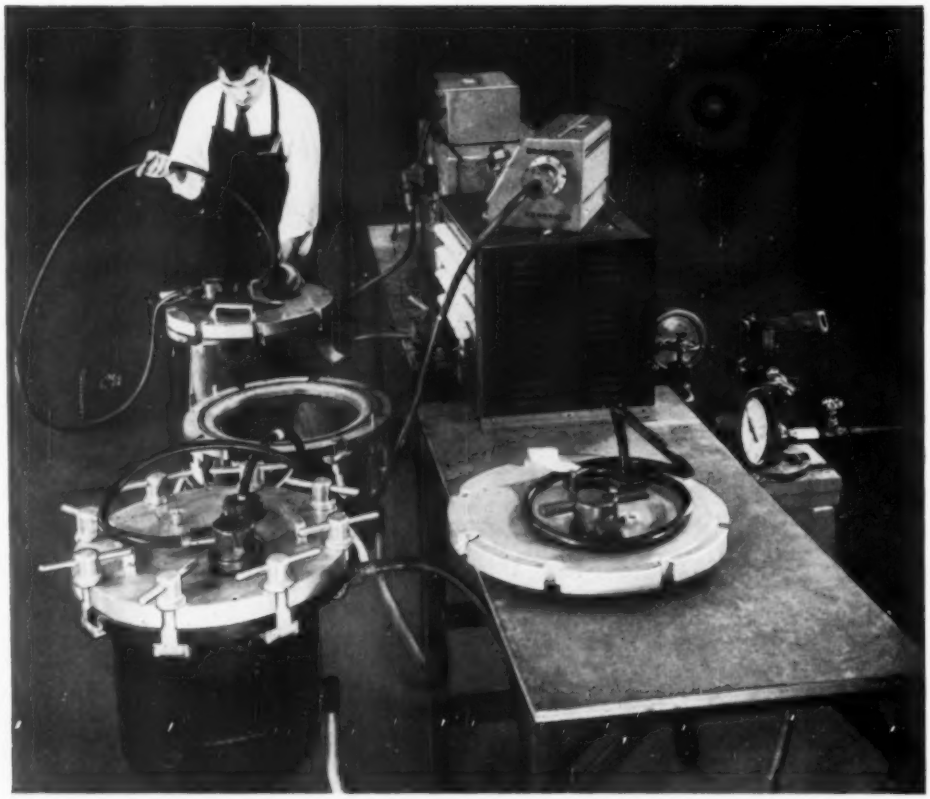
313 N. First St.
Ann Arbor, Michigan

AUDITED PAID CIRCULATION ABC



Torpedo control cables — each with 65 reliable, gold plated contacts and sockets — being tested in water at 750 PSI. The "pinball machine" type testing device has a signal light corresponding to each contact. Faults or failures are easily pin-pointed when any light goes off during testing. This is only one of the exacting endurance tests to which Anton subjects all of its products. 100% testing assures quality and reliability for which Anton Electronics' products are famous throughout industry.

PLATING COSTS DOWN 30%—REJECTS ELIMINATED USING AUTRONEX* ACID GOLD PLATING PROCESS

.....Anton Electronic Laboratories, Inc.

"Since installing the AUTRONEX ACID GOLD ELECTROPLATING PROCESS, our plating production costs are down 30% and still falling", reports Mr. George Weinman, General Manager, Components Division, Anton Electronic Laboratories, Inc., Brooklyn, New York. Mr. Weinman goes on to say that "...during six months' operation—covering the plating of millions of components—plating rejects were practically non-existent."

As manufacturers of precision potentiometers, connectors, special instruments for Atomic Energy applications—as well as the largest producers of Geiger Counter tubes—Anton Electronics could make no compromise with quality. "We knew Sel-Rex was *the* best", says Mr. Weinman, "and after installation we proved the truth of the adage 'the best costs less', in the long run".

The patented AUTRONEX ACID GOLD ELECTROPLATING PROCESS has production-proved its unique advantages for over two years in the plants of leading manufacturers the world over. AUTRONEX can help you make a better, more reliable product—probably at far less cost than with any gold plating formulation you may be presently using. Evaluate AUTRONEX ACID GOLD ELECTROPLATE in your own plant, on your own products. We'd be happy to plate sample parts for you at no obligation. Write... Wire...'Phone. We'll make all the arrangements.

*Trademark for Sel-Rex patented Acid Gold Electroplating Process

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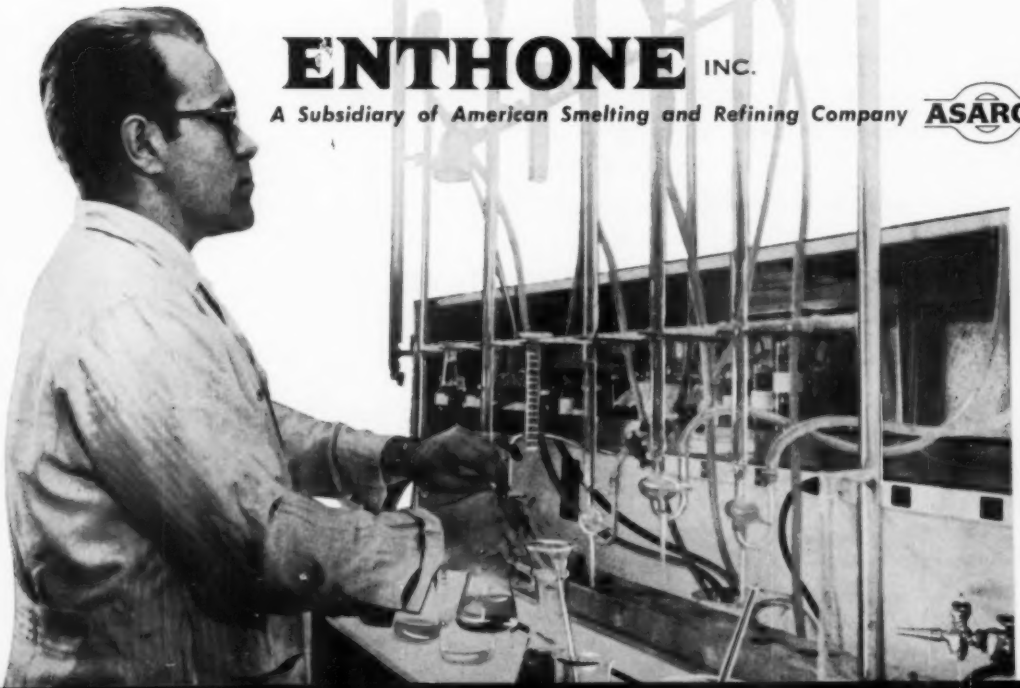

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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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PLATING MAGAZINE is indexed in Applied Science and Technology Index and is abstracted regularly in Chemical Abstracts, Metals Review, Metal Working Review, Metallurgical Abstracts, Engineering Index, Technical Data Digest, Bulletin Analytique and others.

Harshaw announces

NiChlor 31

a significantly improved nickel chloride

IMPROVEMENTS:

- Non-caking
- Contains more nickel —less bulk
- Easier handling
- More uniform particle size
- Same cost per pound of nickel
- Quick dissolving characteristics

A new nickel chloride with less water of hydration demonstrating marked improvements over that previously available to Platers has been developed by The Harshaw Chemical Company.

Called "NiChlor 31," this new product has a typical average of 31% nickel compared with 24.5% in ordinary nickel chloride. This means that .8 lb. of "NiChlor 31" is equivalent to 1 lb. of regular nickel chloride, and results in easier handling and storing.

"NiChlor 31" is non-caking, uniform, and of high purity with quick dissolving characteristics. On the basis of nickel content, "NiChlor 31" is offered at no increase in cost.

Complete information may be obtained by contacting The Harshaw Chemical Company, 1945 East 97th Street, Cleveland 6, Ohio.

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EDITORIAL

TAKE ONE WITH YOU

IN 1940, THE BRITISH ISLES were struggling for their very existence. After the Battle of Dunkirk in France, most of England's troops were either in Africa fighting the Afrika Corps or committed to other parts of Brittania's widespread Empire. Practically destitute of men and arms, it was at this time that England imminently faced invasion by the Nazi military juggernaut.

Against this background, Sir Winston Churchill made one of his most memorable speeches to bolster the morale of the people at home and to inspire them to do everything possible to save their homeland. He rallied all the available able-bodied men and women into the famed Home Guard, and imbued them with the necessity of fighting to the last man to save the Empire. His famous expression, "Take one with you!", will ever be remembered by the English people. From his voice, England recognized that the man on the street was going to be the last fortification of the homeland.

We of the AES are not, of course, in any comparable or related condition, but this famed expression struck me as being an excellent slogan to rally and build an even larger AES membership just as it rallied the English people.

The AES is the only scientific organization dedicated to the advancement of the arts and sciences of the electroplating, metal finishing and allied arts industry through the general education of its members by PLATING MAGAZINE, the AES Research Program, the Annual Convention, TECHNICAL PROCEEDINGS, the Regional and Branch meetings and through other media of the Society. Consequently, if each member of the AES made it a practice to take a fellow worker to his Branch's monthly meeting, he would be doing the Society, the man, himself and the industry a good service indeed.

By bringing qualified new people into our dynamic Society, we can expand its research and educational facilities. By educational enrichment, we not only can keep abreast of the other industries but perhaps actually surge ahead so as to get an even larger portion of the industrial dollar through new techniques, facilities, and men trained to accept new problems facing the industries of the "Nineteen Sixties."

To the end of fostering educational enrichment through effective Branch meetings, an impressive group of available speakers are listed in the AES's Annual Speakers List, and it is up to AES Branches to engage these speakers for such monthly meetings. The individual member, in turn, has the responsibility not only to attend these meetings himself but also to afford good prospective members with opportunity also to benefit from them, thus stimulating desire among them to seek AES admittance on merit. So do remember to "Take one with you!".

Frank O. Beuckman

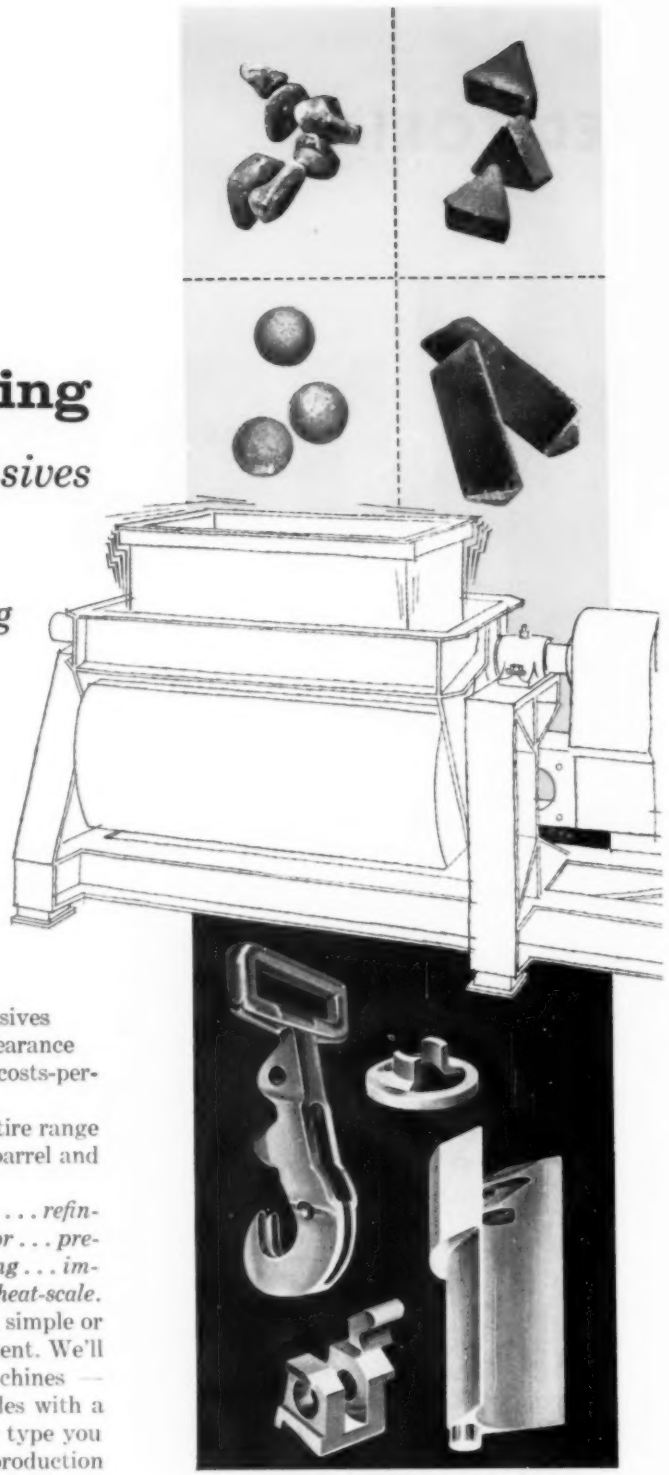
Third Vice President
American Electroplaters' Society, Inc.

PLATING MAGAZINE

Barrel finishing is best finishing

...with TUMBLEX® abrasives

... in every type of rotating or vibratory equipment



Keeping pace with the latest advancements in barrel finishing equipment, Norton TUMBLEX abrasives are first in the field for best results with vibratory machines . . . developed for faster, lower cost finishing of the widest range of parts, especially the most complicated.

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These advantages are also brought to the entire range of barrel finishing operations of both rotating-barrel and vibration types, including:

Removing burrs . . . smoothing off feather edges . . . refining surface finish . . . burnishing for luster or color . . . preparing surfaces for painting, enamelling or plating . . . imparting matte finish . . . removing dirt, grease or heat-scale.

Send your samples of parts — large or small, simple or intricate — to our Sample Processing Department. We'll barrel finish them on the most suitable machines — vibratory or rotating — and return the samples with a report on the TUMBLEX abrasives and machine type you need to improve product quality and cut production costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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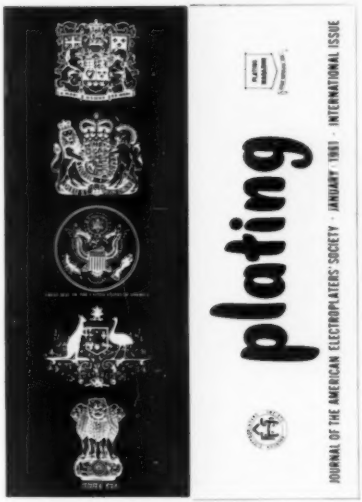
WHAT PLATING MAGAZINE OFFERS TO ITS ADVERTISERS



PROGRESSIVE industrial advertisers and their advertising agencies in today's buyers market are more than ever studiously selective in picking publications to convey their merchandising messages to market. Quality and prestige of publication—coverage of field—readership acceptance demonstrated by subscription renewal—advertising rates—supplementary services helpful to the advertiser—are among collective predicates widely motivating individual choice of media.

To such selective advertisers, PLATING MAGAZINE, in its fifty-first year, offers:

1. An internationally reputed monthly publication whose coverage is demonstrated by the fact that it enjoys the largest audited paid circulation in its field, particularly in the densest concentration areas of electroplating and metal finishing.
2. Appeal and value to its subscribers substantiated by the highest paid subscription renewal percentage in this field.
3. Lowest advertising rates for reaching the foregoing purchasing power.
4. Reader's Service Card assistance to advertisers in seeking reader's response to their advertising.
5. Mailing service available at nominal cost to its regular advertisers thereby enabling them to link direct mail promotion with their magazine advertising.

PLATING MAGAZINE is a member of Audit Bureau of Circulation (ABC). Its circulation is audited by experienced ABC circulation auditors. The facts thus obtained are issued in ABC reports which show how much circulation PLATING has—how it was obtained—where it was distributed—and other information that tells businessmen what they get for their advertising investment in PLATING MAGAZINE'S advertising columns.

Ask to see a copy of our latest available ABC report. Ask, too, for our free booklet, "Market Data and Media File."

Upon Plating's acceptance of contract, and while its supply lasts, a handsome blue and gold Easel (12" x 18") for displaying the Company's own PLATING advertisements to its plant or office traffic is mailed free to each 1961 contract advertiser.

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That's right! "Reliability" is not a new word at Stevens. It's been a watchword in product research, development and application for more than 75 years. And it will be an area of increasing concentration in the future. ■ From gleaming household appliances to automobiles that stay bright-as-new for years, Stevens continues to provide the metal-finishing know-how that gives you the highest possible reliability factor within the required limits of your cost structure. ■ Stevens Liquid Buffing and Polishing Compositions, for example, illustrate what we mean. Whether you require a heavy cut or extremely high color, there's a job-matched formula that performs better, faster, more efficiently. And, when you start with a superior buffed or polished surface on castings, stampings or machined parts, you've taken an important step toward the ultimate reliability of the final plating. ■ In a great many areas of metal processing and finishing, Stevens places valuable experience at your service to help achieve the higher reliability that buyers expect of your products.

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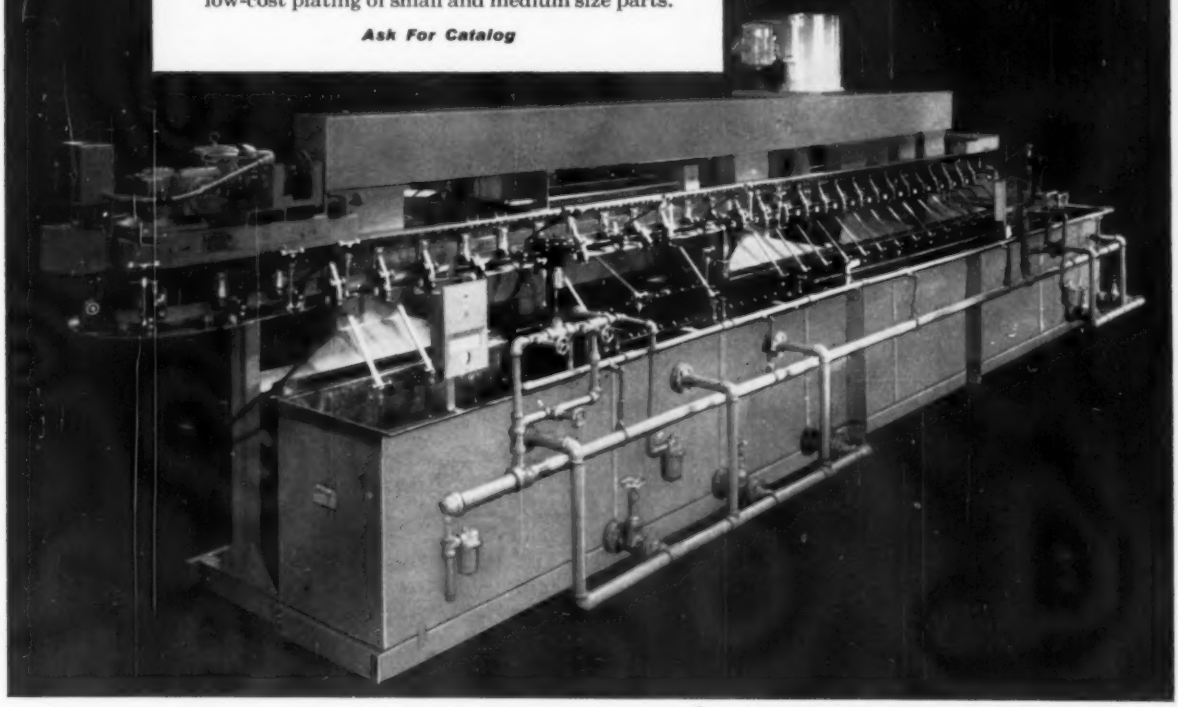

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Title.....

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20% more production on toughest job shop plating

...at no extra cost

Nothing tests a bath like a job shop—and A&A Plating Co. is one that often takes on "problem" jobs for other platers. Work ranges from marble size to big cash register shells, much of it tough combinations of zinc die casts and steel. And in 9 years of testing, A&A hasn't found a bright nickel bath that's "more profitable or easier to work with than Levelume 220." Some of the benefits that A&A reports:

Easy Maintenance. Levelume requires minimum analytical control. A&A's bath did not require batch purification during its first 13 month's operation.

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Faster Plating. A&A has stepped up current and gets 20% more production at no increased cost.

What can *your* shop achieve with high-leveling, better-brightening Levelume 220? Contact H-VW-M for technical details.

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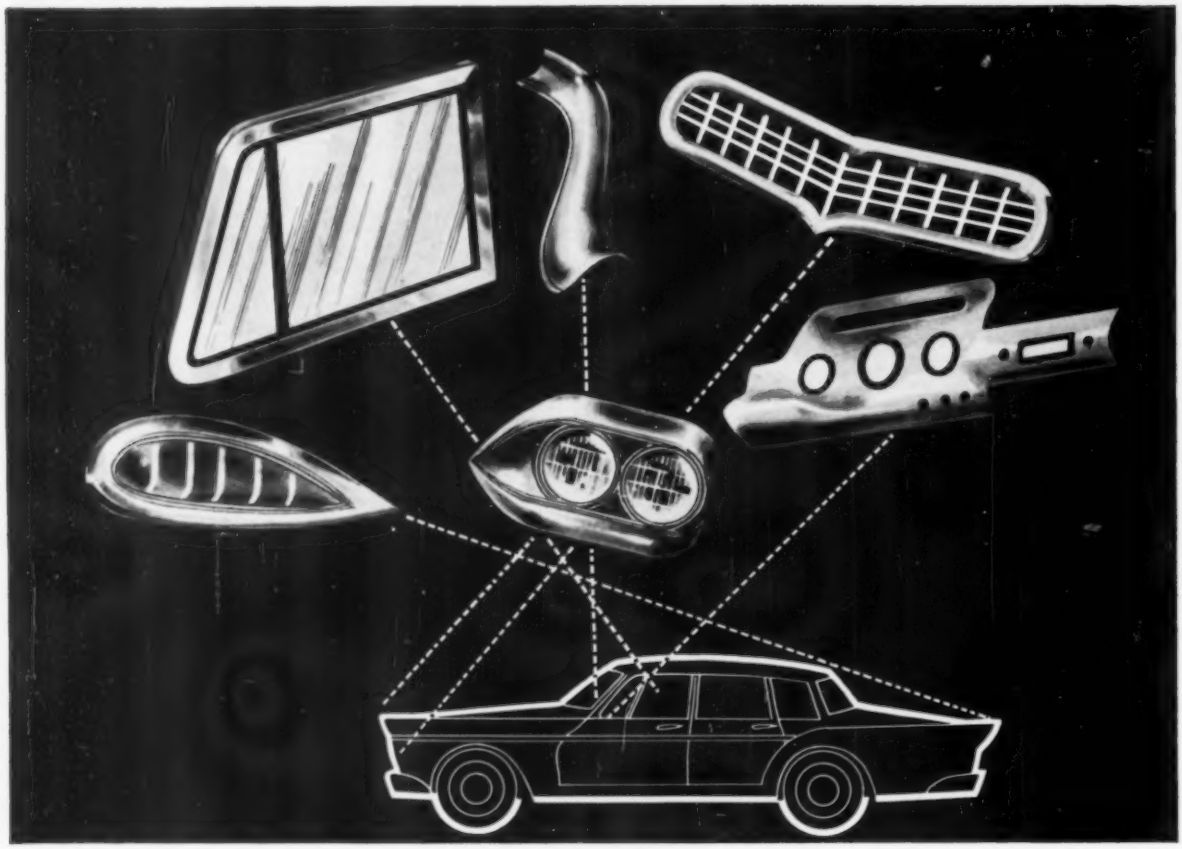

Aluminum adds the bright touch

"Bright dip" aluminum parts and trim bring a high note of glamour to the graceful lines of modern automobiles. Practical, easily-formed aluminum appears as mirror-bright radiator grilles, body trim, window molding, light bezels, and a growing list of other parts.

"Bright dipping" is a chemical polishing process that dissolves the microscopic high points of a metal's surface faster than its low points. Thus, a few minutes' dip in the solution smoothes and thereby polishes aluminum parts to a high lustre. Then they are anodized for protection against wear and corrosion. This unique polishing process—also used with copper, brass and stainless steel—is becoming part of the manufacture of a long list of products extending from automobiles to zippers.

The major ingredient in "bright dip" solutions is phosphoric acid, one of the many phosphorus chemicals produced by Virginia-Carolina Chemical Corporation. V-C Phosphoric Acid, made from elemental phosphorus from V-C's own phosphate mines, is known for outstanding quality and purity. All three grades exceed American Chemical Society, National Formulary, and Food and Drug Regulations requirements where applicable.

V-C Phosphoric Acid	85% N.F. Grade	80% Food Grade	75% Food Grade
Sp. Gr. (20°/4°C)	1.691	1.635	1.581
Lbs./gal.	14.1	13.6	13.2
P_2O_5	61.71%	58.08%	54.50%
H_3PO_4	85.21%	80.20%	75.26%
Cl	0.0001%	0.0001%	0.0001%
Fe	0.0002%	0.0002%	0.0002%
Pb	0%	0%	0%
As_2O_3	0%	0%	0%

FREE BOOKLET "Bright Dip Hints" and samples available. V-C specialists, drawing on years of "bright dip" experience, are happy to give you detailed information in terms of your own operation. Write today!

Virginia-Carolina Chemical Corporation • Chemicals Division
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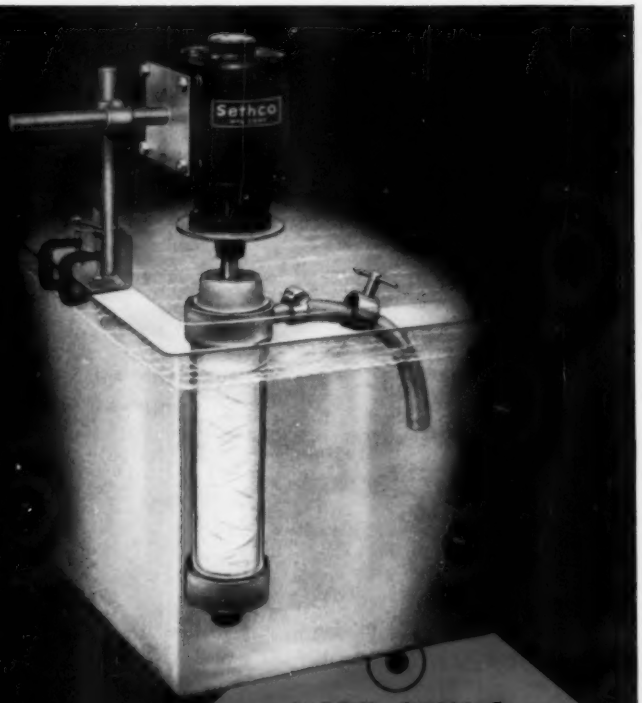

MODEL SUBLL-5

$195.00

ECONOMY IN COST
ECONOMY IN OPERATION

SETHCO MODEL	WORK RATE CAPACITY	MAXIMUM FLOW RATE*	SETHCO PRICE
SUBLL-5	50 gph	250 gph	$195.00
SUBLL-10	100 gph	400 gph	$295.00

*Certified Field Results (sent on request)

"tagged" as the finest *at lowest cost...* by platers, chemists and engineers

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- no loss of expensive solutions
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- maximum flow rate up to 4x our own work rate capacity
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- filters from all levels, not just the surface; skimmer available to keep surface free of dirt
- completely corrosion resistant
- trouble-free operation; one-year guarantee

UNIVERSAL APPLICATIONS

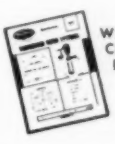
For filtering every solution:
from lead to gold
from pH 0 to pH 14
from 70° F. to 200° F.

Only SETHCO gives you optional custom equipment at standard cost!

HIGH TEMPERATURE APPLICATIONS: Electroless nickel, etc.
HIGH CHLORIDE APPLICATIONS: Woods' Nickel, Iron, etc.
CHROMIC ACID APPLICATIONS: Oxidizing baths, etches, etc.
ALL METAL CONTACT ELIMINATION: Acid gold, rhodium, etc.
SKIMMER: Removes surface dirt.

SETHCO — recognized throughout the filtering industry for "first with the finest"—now offers a completely new concept in a universal, submerged system. This new SUB series, thoroughly tested in lab and field, has already more than proved its reliability and unmatched economy. No valves to leak, no tank drains to fuss with, no chance for costly fluid loss. The nearest thing to automation in filtering!

Sethco



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FOR • ANALYSIS
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• No "Knowledge of chemistry" required • Streamlined methods • Direct readings •
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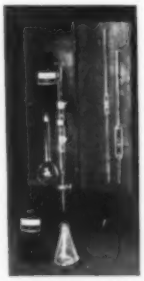

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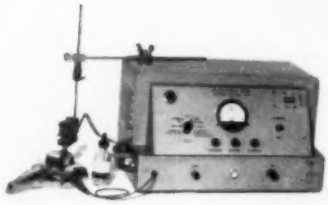

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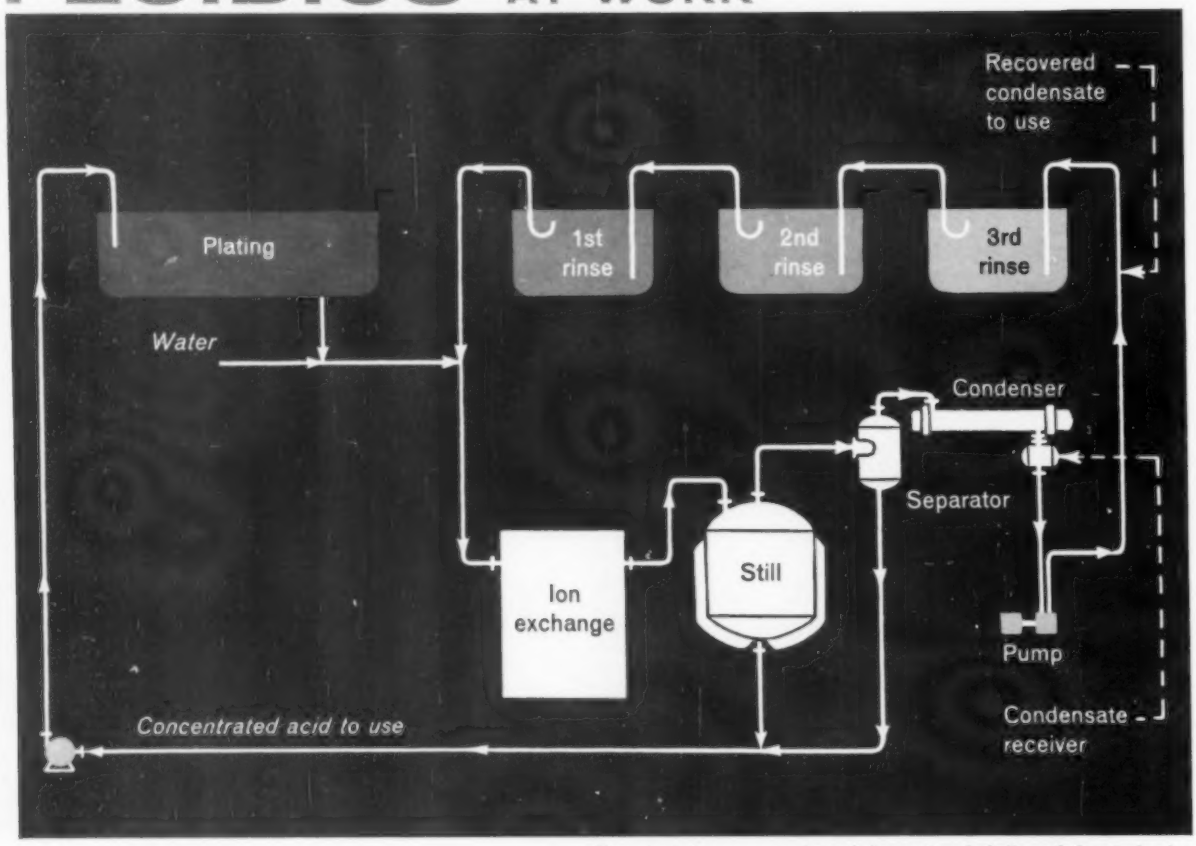

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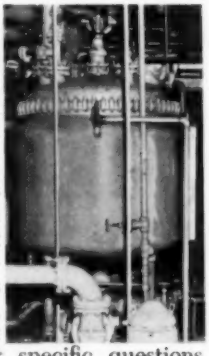

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Most of the articles listed here may be obtained by writing to the publications in which the articles were published. Addresses are given at the end of the references for the reader's convenience.

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Accelerated Corrosion Test for Tin Plate in Grapefruit and Other Juices. P. R. Carter and T. J. Butler.
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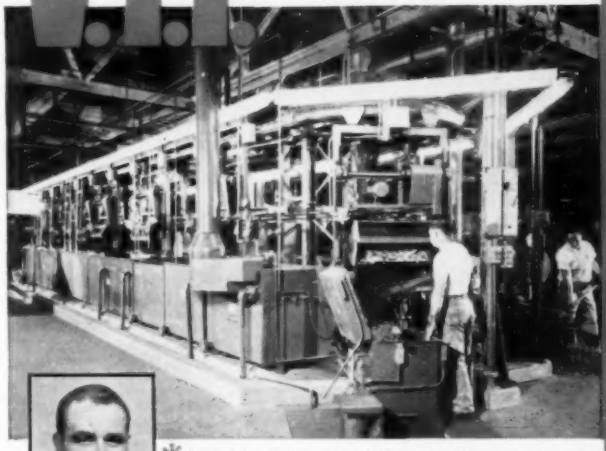

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Geo. Clayton Field.
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b. *EVALUATION OF ELECTRODEPOSITED COATINGS.*
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The Hydrogen Content of Electrodeposited Nickel (and Nickel-Rich Nickel-Zinc and Nickel-Thallium Alloys). E. Raub and F. Sautter. (Metalloberfläche, 1959, 13, (5), pp. 129–132).

NICKEL

The Effect of Wetting Agents on the Hardness of Electrodeposited Nickel. H. Spähn (Metalloberfläche, 1959, 13, (8), pp. 259–264).

ULTRASONICS

Influence of an Ultrasonic Field on the Elastic Properties of Steel in Zinc Electroplating. A. M. Ginberg and A. P. Gorina (Metallovedenie i Termicheskaya Obrabotka Metallov, 1959, (8), pp. 20–24)—(In Russian). Some reduction in elastic properties occurred when spring-steel specimens were degreased in NaOH 100, Na_2CO_3 50, Petrov wetting agent 20 g/l; a greater reduction was observed in the first few min. when ultrasonics were used in cleaning, but recovery took place as the process continued and the original values were regained after 19–20 min. Ultrasonics increased the pickling rate in inhibited 2N-HCL by 3–5×; the elastic properties began to be affected after 2 min. (compared with 20 sec. for the uninhibited acid). Anodically-cleaned and pickled specimens were Zn plated in either $ZnSO_4$ 250, $Al_2(SO_4)_3$ 40, Na_2SO_3 80, dextrin 10 g/l (pH 4.1) or ZnO 40, NaCN 90, NaOH 70, Na_2S 5 g/l; ultrasonics accelerated the deposition. Ultrasonics improved the elastic properties of the steel until the deposit thickness reached -6μ above which there was a fall to the values obtained without ultrasonics. The results are discussed in terms of H adsorption An editorial note criticizes the apparatus used.

The following are Metallurgical Abstracts taken from the Journal of the Institute of Metals, December 1960, pp. 377, 379 and 380:

CHROMIUM

Conditions for Electrolytic Production of Alloys of Chromium with Other Elements. D. N. Usachev and A. T. Vagramyan (Zhur. Fiz. Khim., 1960, 34, (1), pp. 229–230)—(In Russian). Lack of success with electrodepn. of Cr alloys comes mostly from the fact that the alloying element is introduced in soln. in the cationic form, and cannot be co-deposited because of difference of potential If, however, the alloying element is introduced in the anionic form and can find its way into the cathodic film, it can be deposited through multi-stage reduction In this way 85 : 15 Cr-Mn alloys were deposited from soln. contg. CrO_3 200, $KMnO_4$ 395, H_2SO_4 2 g/l. at 20C and 10 amp/dm², 63 : 37 Cr-Se² alloys from soln. contg. CrO_3 250, H_2SO_4 36.2 g/l., and Cr-Be alloys by similar methods. In all cases current efficiency was of the same order as for pure Cr.

The Electrodeposition of Iron-Chromium Alloys from Complex Trivalent Chromium Sulphate Solutions. Willibald Machu and M. F. M. El-Ghandour (Werkstoffe u. Korrosion, 1960, 11, (5), pp. 274–283).—Preliminary work established the standard bath as $Cr_2(SO_4)_3$ 0.4, $FeSO_4$ 2, $(NH_4)SO_4$ 2, $CO(NH_2)_2$ moles/l. *p*H 1.26, temp. 60C. The Cr content of the deposit rises from 8 percent at *p*H 0.7 to 18.6 per cent at *p*H 2.0, then falls to 10.6 per cent at *p*H 2.65. For *p*H 1.95, the Cr content is a max. of 21.0 per cent at 35C and falls to 14.82 per cent at 80C. Increase of c.d. for *p*H 1.95 and 60C from 6.66 to 33.3 amp/dm² increases the Cr content from 10.1 to 19.2 per cent and the total current efficiency with respect to the alloy from 0.98 to 31.19 per cent. Boric acid addn. improves porosity and smoothness. For current efficiency and brightness of the alloy, Cu, brass, Zn, and Ni were good as cathode materials and Al was poor. At 60C and *p*H 2.1, Cu cathode, and particular bath compn., it is possible to make the deposition potentials of Fe and Cr equal at −0.68 V. The c.d./-potential curve for the alloy lies between those of the pure metals but is nearer to Fe so that more Fe than Cr is always deposited.

NICKEL

The Influence of Urea on the Electrodeposition of Nickel. W. Machu and F. M. El-Ghandour (Werkstoffe u. Korrosion, 1960, 11, (5), pp. 283–286.

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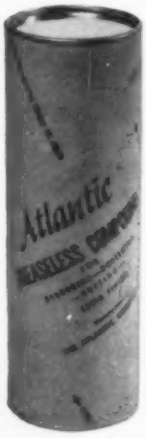

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Comparable in quality to the GOLDEN JUBILEE EDITION of TECHNICAL PROCEEDINGS (1959 Edition) that earned worldwide acclamation in technical, scientific and other educational circles, AES's 1960 Edition, another treasure chest of knowledge on electroplating, metal finishing, organic coating and allied arts, contains the full text of each of the 31 papers delivered by experts before the 47th Annual Convention of American Electroplaters' Society, Inc., held in Los Angeles, California, July 24-28, 1960.

Embodying, too, the charts, diagrams, graphs, tables and other illustrations of each of the 31 published papers, the book also includes the transcript of the discussion that attended the delivery of each paper. A full list of the papers published in this voluminous repository of education appears on the opposite page of this announcement.

The unique book also includes, among other data, a day-to-day log of the Convention; a section on the AES Scientific Achievement Award and on other AES technical and scientific awards and honors bestowed at that first West Coast National AES Convention; a full listing of the Boards and Standing and Special Committees that served the AES during its fifty-first year, and a complete AES Branch Directory.

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A limited but fast dwindling extra quantity of the 1960 book has, as stated, been printed to meet the sizable interest shown in it by AES non-members internationally. Orders for copies of the book are now consequently invited from AES non-members, and will be accepted on strictly a "first come-first served" basis so long as that extra supply lasts. The book is unavailable for purchase elsewhere.

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♦

The AES was welcomed to California and Los Angeles by Governor Edmund G. Brown and by Mayor Norris Poulson. The entire week of the AES's Convention was, in fact, proclaimed by Los Angeles's Mayor as "American Electroplaters' Society Week in Los Angeles."

♦

Educational Sessions numbered nine. Experts presented 31 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. One Session alone covered organic finishing.

High spots of the Sessions were not only the second annual "William Blum Lecture" that was delivered as the Educational Program's lead-off attraction by Dr. A. Kenneth Graham, 1959 winner of the "AES Scientific Achievement Award", the Society's highest scientific honor, but also the vaunted two-session, eight-paper "Hydrogen Embrittlement in Metal Finishing Symposium." In addition, this Convention also featured the summary of AES Research Projects presented by AES Research Committee Chairman James D. Thomas at one of the Sessions.

♦

Under the active planning and supervision of the AES's Editorial Board itself, the Educational Sessions were programmed for the AES by Host Branch Educational Chairman Earl W. Arnold and his Co-Chairman, David F. Seymour, with Dr. Harold J. Read of Pennsylvania State University, a special member of that Los Angeles Branch Committee, responsible for the "Hydrogen Embrittlement in Metal Finishing Symposium."

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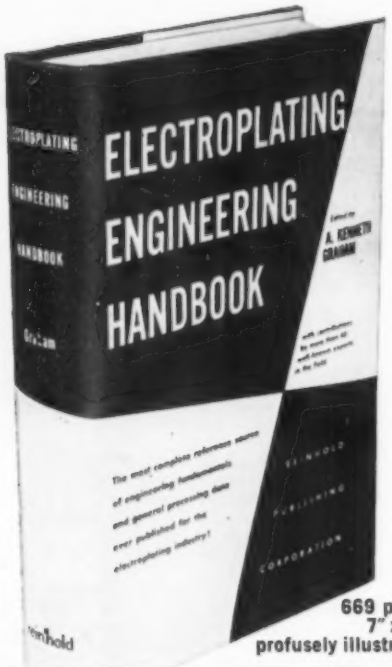
(1) Dr. William Blum introducing Dr. A. Kenneth Graham, deliverer of the 1960 "William Blum Lecture." (2) Attentive audience hears Dr. Graham discuss "Faraday's Laws Applied to Cleaning." (3) Dr. Graham holds "AES Scientific Achievement Award" scroll presented to him by National President Ralph D. Wysong, right, in behalf of American Electroplaters' Society, Inc.



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Spanning some 400 pages (by far the largest annual TECHNICAL PROCEEDINGS ever published by the AES in its half-century lifetime), this 1959 edition also includes, among other data, a day-to-day log of the Golden Jubilee Convention; a section on the AES Scientific Achievement Award and on other AES technical and scientific awards and honors bestowed at the Golden Jubilee Convention; a full listing of the Boards and Standing and Special Committees that served the AES during its Fiftieth Anniversary year, and a complete AES Branch Directory.

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GREETED by the President of the United States, the AES was welcomed to Michigan and Detroit by Governor G. Mennen Williams. The entire week of the AES's Convention, Exposition and International Conference was proclaimed by Detroit's Mayor as "AES GOLDEN JUBILEE WEEK IN DETROIT."

AS the Fifth International Conference on Electrodeposition and Metal Finishing, the Golden Jubilee Convention's educational sessions numbered eleven. Experts from nine countries, including the United States, England, Canada, Australia, France, Germany, Holland, India and Italy, presented 43 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. High spot of the sessions was the first "William Blum Lecture" that was delivered by the eminent Dr. William Blum, first winner of the AES Scientific Achievement Award, the Society's highest honor.

UNDER the supervision of the AES's Editorial Board, in collaboration with the International Council on Electrodeposition and Metal Finishing, the International Conference was planned for the AES by AES Past President Walter L. Pinner, Chairman of the International Council. His Committee included Dr. T. P. Hoar, Dr. Simon Wernick, A. W. Wallbank, R. A. F. Hammond and George Gardam of England and Myron B. Diggin, Dr. Walter R. Meyer and Dr. Richard B. Saltonstall of the United States.

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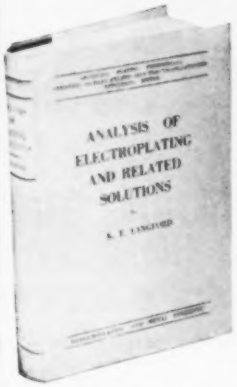

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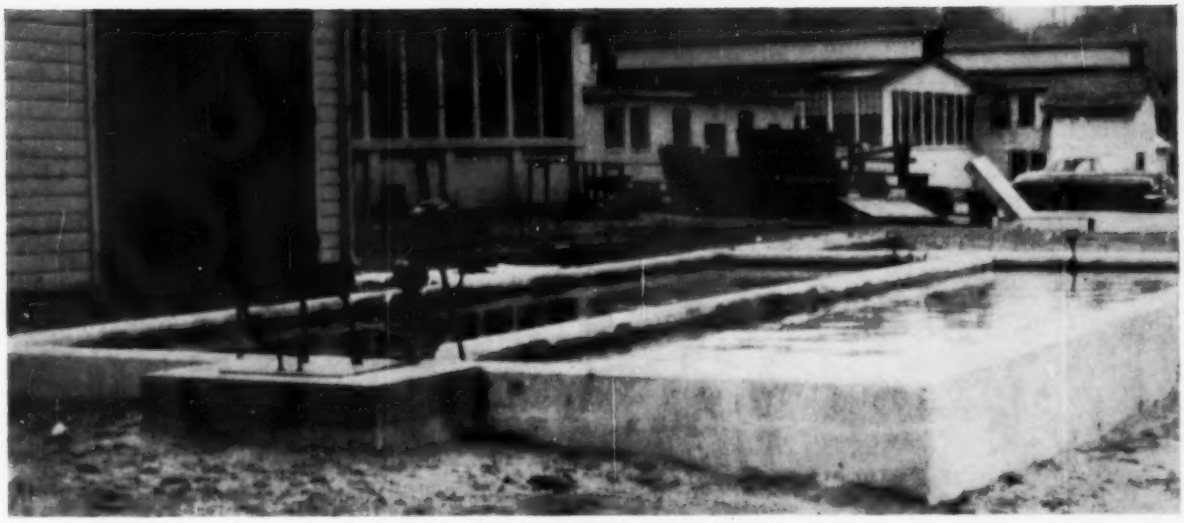


Batch treatment tanks with shear gates and stirrer.

WASTE DISPOSAL FOR METAL FINISHING INDUSTRIES*

by I. LAIRD NEWELL**

INTRODUCTION

THE POLLUTION OF BOTH surface waters and underground water is objectionable for many reasons. Since pure water is necessary for life and health, it is important to maintain the purity of our national water supplies as far as possible. This is especially true in view of the rapidly increasing population and the rapidly growing industries. Because of the increased industrial use of water and the rapid expansion of industry in general, our streams are no longer able to take care of industrial wastes by dilution alone. While it is possible that certain industrial uses of water, such as for cooling purposes, will not produce contamination, the addition of almost any industrial waste product will cause contamination so that a water is unclean for one use or another.

The United States Public Health Service estimates that the construction of 4000 new sewage treatment plants and the modernization of 1700 more is needed to handle sewage now dumped into streams. The cost of construction up to 1968 is estimated at $4.6 billion. It is also estimated that 6000 new projects are necessary for industrial discharges and that these facilities would cost about $2 billion. To provide for additional growth, an annual expenditure of $575 to $600 million will be necessary to provide needed facilities by 1968.

INDUSTRIAL WASTES

While the industrial wastes which must be considered in an overall study of pollution include gaseous, solid and liquid wastes, it is the purpose of this paper to confine the discussion to liquid wastes or those liquids which may carry contaminants to streams or underground streams. In highly industrialized states with a preponderance of highly skilled workers, it is only natural that many of the industries would deal with metals and metal finishing.

As examples of the water required in industrial production, it should be noted that it requires 110,000 gallons of water in the manufacture of one ton of steel, 45,000 gallons for one ton of paper, 400,000 gallons for one ton of rayon. A total of 72 billion gallons per day is the estimate for the industrial use of water in this country.

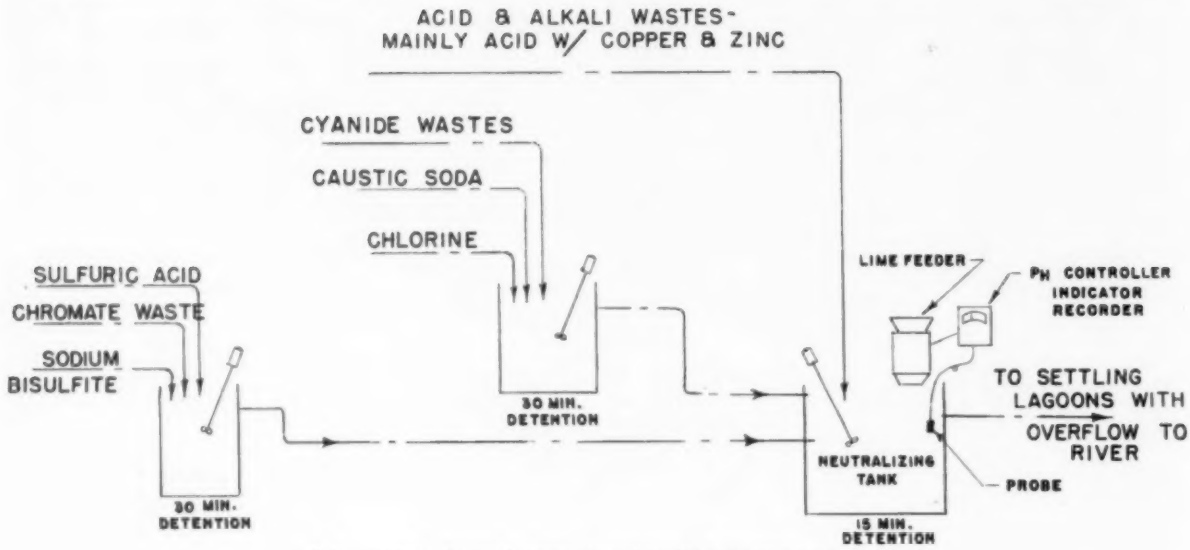
In southern New England, fresh water may be obtained from surface supplies at a maximum rate of about one million gallons per day per square mile and from ground water sources, at about ⅓ million gallons per day per square mile. The fresh water supply available will soon be insufficient for industrial and domestic requirements. Some industries are already re-using water for some of their requirements and many water departments and companies require that water for air conditioning be recirculated in the system.

Many of our industries situated on large rivers re-use water containing wastes from industries and municipalities upstream.

The effect of municipal use of water on water quality even

* Paper presented at the February 2, 1961 meeting of the Boston Branch of the American Electroplaters' Society.

** President, The Henry Souther Engineering Company, Hartford, Connecticut.



Schematic flow diagram for separate and combined treatment processes.

after complete treatment was studied in Chicago and results are given in the following table:

	Lake Michigan Water	Raw Sewage	Completely Treated Sewage	USPHS Drinking Water
	parts per million			
Total Solids	170	654	518	500 max
Nutrients (NO_3 and PO_4)	0.35	7	5	
Organic Matter	0.50	357	223	
Detergents	0	10.5	7	
Minerals	169	283	283	
Chlorides	6	—	90	500
B. O. D.	1	125	18	

STANDARDS OF PURITY

Standards for purity of industrial wastes have been established for industries on many of our streams. For those industries having electroplating or other metal finishing processes, the following limits frequently used by the Connecticut Water Resources Commission are desirable and can be maintained at well designed and operated plants.

*p*H		6.5 to 8.5
Color	max	50 ppm.
Turbidity	max	50 ppm.
Copper	max	3 ppm.
Zinc	max	3 ppm.
Nickel	max	3 ppm.
Chromium (Hexavalent)	max	3 ppm.
B. O. D.	max	25 ppm.
Oil or Grease	max	20 ppm.
Cyanides		0.5 ppm.

The setting of fixed standards for waste waters is an extremely difficult task especially if the lowest overall cost to users of the stream either for water supply or waste disposal is required. Partridge in the ASTM Marburg Lectures in 1957 stated that "only 10 ppm of dissolved sodium salts, an apparently insignificant amount of an obviously innocuous contaminant introduced at Monessen 41 miles up the Monongahela River from Pittsburgh will increase the cost of water for the power plants of the steel mills between there and Beech Bottom 71 miles down the Ohio by more than $28,000 a year. Most of this would be wasted in the form of increased blowdown from the boilers."

WASTE SURVEY

The first step in the establishment of waste control and treatment is a study of processes involved, including measurements or estimates of the volumes from each individual operation. This data should include not only the daily totals but also minimum and maximum rates of flow, cycles where used, and time where the operations are intermittent.

A sufficient number of waste samples of the "grab" type should be taken to determine the maximum and minimum strength of the waste and a composite sample should be taken for a sufficient number of days to give the average composition. The volume and kind of chemicals purchased for a year should be tabulated for study.

A study of the site for proper location of drains, tanks, lagoons, is necessary and knowledge of the stream flow and watershed is desirable.

All of this information, including estimates of growth of the industry, must be considered in choosing the proper disposal methods. The disposal system must be designed individually for every plant even though the same wastes are created in similar industries. No two plants have the same operating rates, tank sizes and methods of treatment even though the same product is manufactured.

INTERNAL CONTROL

From an economic standpoint, it is better to prevent wastes from getting into water than to remove them from the water. Thus, the separation of clean water used for cooling and similar purposes from contaminated waste water in the design of a plant will materially reduce the volume of liquid to be treated and reduce the size and cost of tanks and mechanical equipment. The use of intermittent spray instead of running rinses, counterflow in standing rinses and recovery rinses to return

to the solution tanks, not only reduces the waste to be treated but also saves valuable raw materials. Fundamentally it is good practice to keep the waste volume as small and as concentrated as possible. In some instances, it is desirable to investigate the use of other materials for the operations producing contaminated wastes to either lower the cost or eliminate the waste. As an example, one plant requiring only a moderately bright but passive finish on a zinc plated part substituted a sulfuric acid-peroxide dip in place of a chromic acid-sulfuric acid dip. This eliminated the special equipment and process for treating chromates.

It is suggested that other recovery methods such as drip tanks following plating baths and steam condensation rinses be considered for economic reasons.

TREATMENT PLANT DESIGN

In general, treatment plants may be classed as "flow thru" or "batch" type plants. The batch type plants are generally lower in first cost since there is no need for automatic control of the chemical feed machines. The batch type plants are preferred where the volume of waste to be treated is relatively small (less than 15 gpm) and where the concentration or rate of discharge of the waste varies widely. The flow thru type is preferred where large volumes are encountered and where a more or less uniform concentration is encountered. It is the duty of the consulting engineer to study the operations of the plant producing the waste and decide whether a batch or flow thru process is best suited for the treatment plant.

If at all possible, the cyanide wastes should be separated from all other wastes and the same should be done with chromate wastes. The additional piping to do this will frequently cost far less than the additional tanks and processing necessary to adequately treat mixed cyanide, chromate, and alkaline or acid wastes.

TREATMENT METHODS

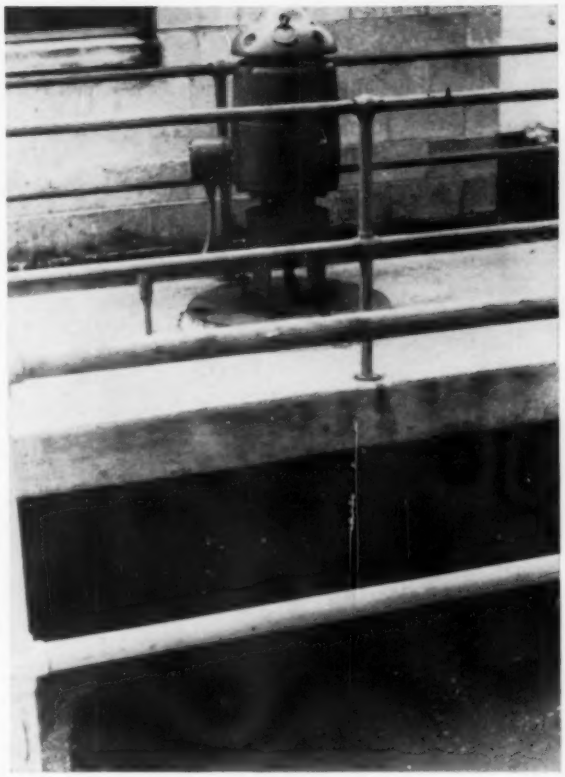
The treatment of wastes from metal working industries will depend entirely on the processes used in the industry. If expensive metals such as silver, gold, platinum, palladium and, in some cases, chromium are used, it will probably be most economical to use treatment methods to recover the metals. This can be done by ion exchange or evaporation. Since many of the wastes are highly diluted, the ion exchange method is most frequently used. Where the wastes consist of mixtures of chromates, acids and metals, with or without cyanides, destruction methods are most suitable. However, since the size and cost of the equipment and tanks will depend upon the volume of the wastes, every effort should be made to reduce the volume.

METAL RECOVERY BY ION EXCHANGE

In addition to the recovery of metals having value, the ion exchange method produces an effluent which is a very pure water and could be used for such special purposes as makeup water for steam boilers and for use in certain types of plating baths such as gold, rhodium and platinum as well as in rinse tanks where absolute freedom from deposits is necessary.

Silver

Silver may be readily recovered from cyanide rinse waters by means of a strongly acidic sulfuric cation resin along with a strong base anion resin. The rinse waters would flow through the cation and anion resins in series, using a flow rate not exceeding 5 gallons per minute per square foot. The silver cyanide complex will be retained in the cation resin and pass hydrogen cyanide to the anion resin where it will be retained. The resin can be regenerated using sodium hydroxide for the anion resin, which will produce sodium cyanide, and this passed through the cation resin will recover the silver which can then be returned to the bath or precipitated with chlorine to form silver chloride.



Aerating-type mixer.

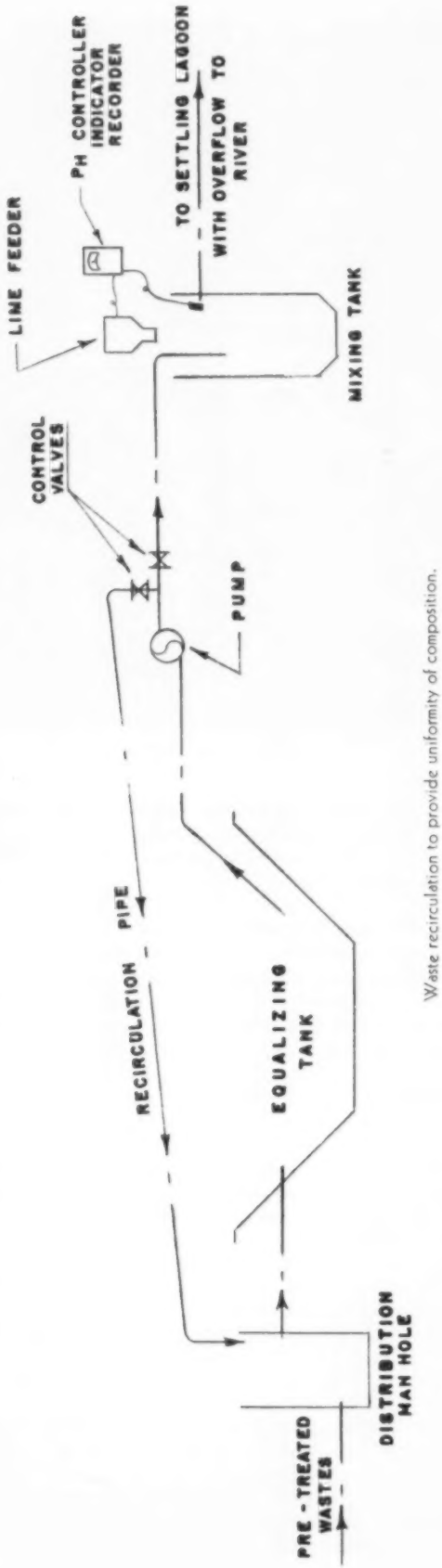
Gold and Other Precious Metals

Gold can be recovered by passing the rinse water through a strong base anion exchanger of the hydroxide form. After the resin is saturated, it is burned to recover metallic gold. Platinum and palladium can be recovered using the same process as for gold.

Chromium

New cation exchange resins which are resistant to oxidation by chromic acid have recently been developed and make possible the recovery of chromic acid in quite strong solution. Chromic acid anodizing baths may be passed through a cation exchange resin which will remove aluminum and other impurities from the bath so that there will be no further need to discard the chromic acid anodizing bath. In addition, the chromic acid rinse waters may also be reclaimed by passing through both cation and anion base exchangers, and the hexavalent chromium is recovered from the anion exchanger to be returned to the bath. This method may be also used for rinse waters from chromic acid plating baths and bright dip solutions.

The cost of operating an ion exchanger which recovers all the water and all of the chromic acid (concentration three to six per cent) is approximately 25 cents per pound of chromic acid recovered. An additional value is obtained from the deionized water also recovered. This compares with about 20 cents per pound for chemical methods of destruction.



Waste recirculation to provide uniformity of composition.

RECOVERY BY EVAPORATION

Evaporation is not practiced a great deal for recovery due to the high cost when the solutions are extremely dilute. Evaporation would only be desirable where valuable products will be obtained from rather strong solutions. The production of pure water by distillation of saline or brackish waters with modern methods costs $2.00 per 1000 gallons.

DESTRUCTIVE METHODS OF TREATMENT

Where the waste waters contain dilute solutions of acids, alkalis and non-precious metals, the destructive methods are probably most economical for the industry. As indicated earlier in this paper, the wastes should be separated as far as possible in order to segregate chromate and cyanide wastes. The type of process to be used will depend, of course, on the volume and strength of the waste.

Cyanide

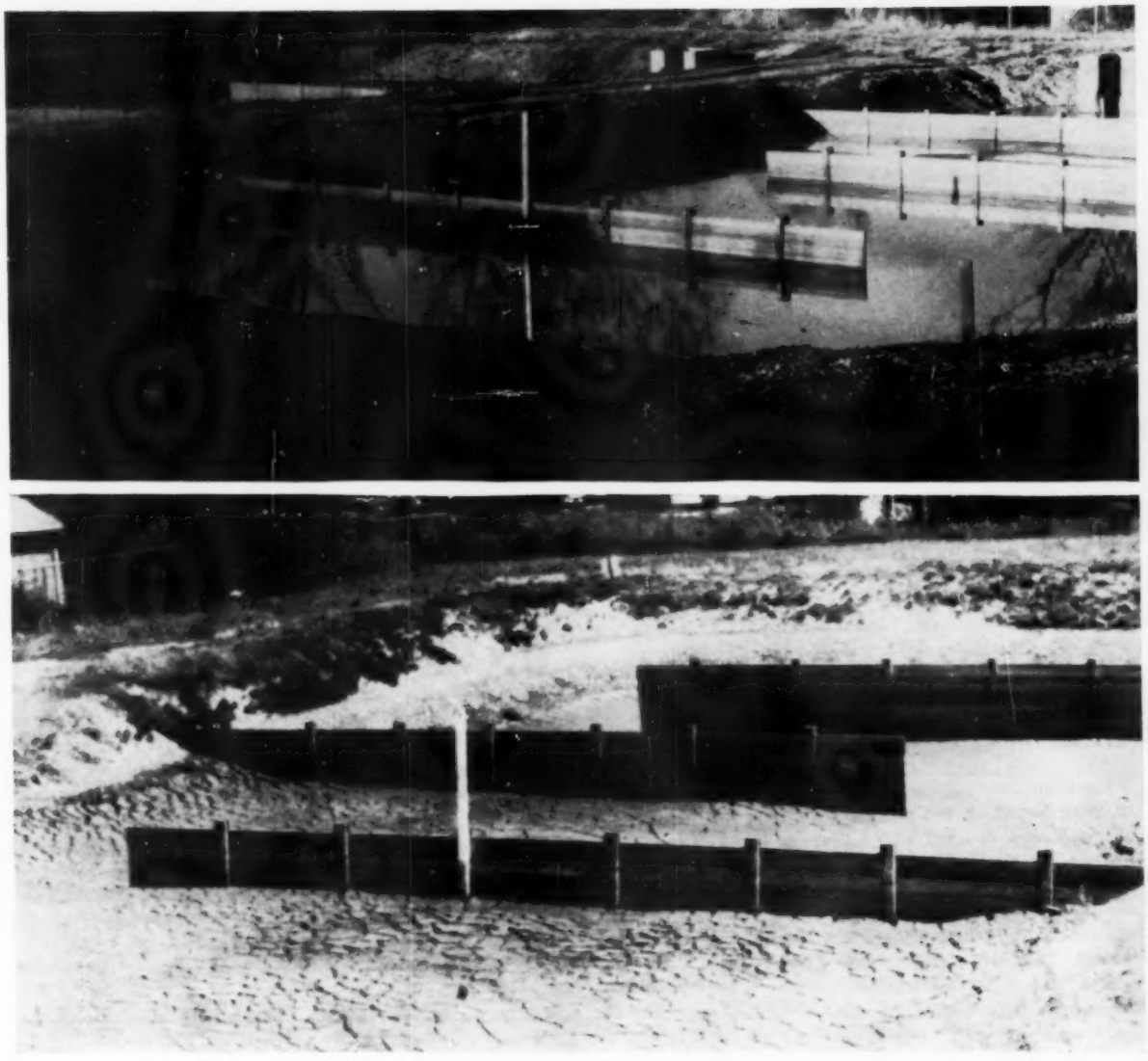
Much work has been done on the destruction of cyanide by chlorine and it is not the intent to discuss the chemistry of the reactions in this paper. However, in order to get complete destruction of the cyanide to cyanate, it will be necessary to process the solution at high *p*H (8.5 to 11.0) and if further destruction of the cyanate is necessary, the *p*H should be lowered (7.0 to 8.5). If the operation is a small one and only a small amount of waste is produced, it may be possible to arrange the plating room cycle so that a standing rinse follows the cyanide plating bath and a sodium hypochlorite solution after the standing rinse. The sodium hypochlorite solution would be maintained at high strength and the rinse waters following the hypochlorite solution would contain the oxidized cyanide in the form of cyanate. Where the operation is larger, it would be desirable to treat the cyanide rinse waters by a batch process using a hypochlorite such as sodium hypochlorite solution. In still larger operations which involve continuous treatment, an equalizing tank should be used with *p*H control and an excess of chlorine fed to the tank on a continuous basis by using chlorine in the liquid form. Satisfactory treatment in both the batch and continuous processes may be obtained using a *p*H of 8.5 to 9.0.

Chromates

Chromates may be destroyed by reducing agents such as sulfur dioxide, sodium sulfite or bisulfite, sodium thiosulfate and ferrous sulfate. The reduction must take place in an acid solution and it is common to add sulfuric acid if necessary to produce a *p*H of 2.5. This can be done in either batch or continuous treatment processes and the effluent must be further treated with lime or other alkali to precipitate the reduced chromium.

Metals

Metals are generally carried in the industrial waste in acid form and many of the common metals are precipitated by neutralizing or making the waste water alkaline. This is generally done with lime since it is one of the cheapest of the alkaline agents. A *p*H of 8.0 to 8.5 is generally recommended and automatic control is possible if recirculation is provided. It is customary to combine the treated chromate waste and the treated cyanide waste with the acid metal waste and then neutralize the combined wastes with lime. The precipitated metals are then removed in a clarifier or in settling lagoons before entering the stream.



(TOP) Settling lagoons showing baffles to prevent short-circuiting. (BOTTOM) Dried sludge in settling lagoon.

LAGOONS

Lagoons are a valuable adjunct to any waste treatment plant. They are generally quite inexpensive to construct and can frequently be placed on property which has low value. Lagoons can be constructed for seepage, for settling and for evaporation.

Seepage lagoons are infrequently used and are not recommended because of the likelihood of contamination of ground water and because special construction methods are necessary to take care of the clogging which inevitably results unless the waste is extremely acid. Great care should be taken in selecting the location of lagoons, especially seepage lagoons. A set of seepage type lagoons located several hundred feet from a municipal well supply contaminated the water so badly that the well was put out of operation. In another instance, settling type of lagoons leaked sufficient waste into the ground to contaminate a well a few hundred feet away with cyanide.

Settling lagoons are desirable for the final clarification of waste water. The detention period should be as long as possible. Many which we have recently designed can store waste for a week or more. Unless the lagoons are long and narrow, it will be necessary to use baffles to control the path of waste through them. We recommend that lagoons be built in duplicate so that one may be cleaned without stopping the treatment operation. Lagoons are also a good safety factor in case of treatment failure or inadvertent spillage. Secondary treatment can be applied at the lagoons.

Drying beds or lagoons are used for the dewatering of sludge and are necessary if the sludge is to be carted away for fill. These are generally quite small and the exact design will depend on the character of the sludge being treated.

BATCH TYPE TREATMENT PLANT

An example of a batch type treatment plant is one designed recently for a manufacturer having a small zinc plating

Treatment building with treatment tanks underneath.

department as part of his overall operation. The zinc plating operation consisted of the usual cleaning operations as follows:

1. Alkali soak clean
2. Water rinse—running
3. Sulfuric acid pickle
4. Water rinse—running
5. Cyanide dip
6. Water rinse—running
7. Zinc plate—cyanide solution
8. Water rinse—running
9. Water rinse—running
10. Chromate-sulfuric bright dip
11. Water rinse—running
12. Hot water rinse

The total daily volume of waste from these operations was 10,000 gallons. A two-compartment tank with necessary mixers, baffles, etc. and with a generous factor of safety for size was designed together with two lagoons each having a capacity of one week's discharge from the plant. It was recommended that the running water rinses following the soak clean and acid dip be continued but that aerating type siphon breakers be installed on the water line and carried to the bottom of the tank to give agitation. It was recommended that the water rinse following the cyanide dip be dispensed with and the cyanide carried over into the plating bath. The first water rinse following zinc plating is to become a standing rinse for recovery and return to the plating bath, and the second water rinse converted to a sodium hypochlorite dip. A new water rinse follows this dip and the chromate-sulfuric acid bright dip is converted to a peroxide-sulfuric acid dip. Thus, by internal changes in the plant, the volume and concentration of waste is materially reduced. The cyanide is destroyed in the hypochlorite dip and the waste water now contains only materials which require only a small amount of lime to adequately treat. This is done once a day and controlled solely by *p*H equipment.

FLOW THRU TYPE TREATMENT PLANT

An example of a flow thru type of treatment plant is one in operation for about two years by a manufacturer using brass as the base material. This company at times operates on two shifts and has a large volume of contaminated waste water. The finishing operations include silver plating and the bright dipping of brass. Without going into details of the plating and dipping operations which have been modified to give the lowest waste water volume and contamination compatible with satisfactory finish on the parts, the wastes were separated into those containing cyanides, chromates and acids. All of the wastes contained metals such as silver, copper and zinc. The treatment plant was designed as a three-compartment tank, a large compartment in the center and two small ones at each side. In one small compartment, the chromium-containing wastes are treated with sulfuric acid to *p*H 2.0 and sodium bisulfite added to reduce the chromium. A detention time of one-half hour has been found sufficient if the *p*H is maintained at 2.0 or less. The effluent from this tank is led to the center tank where it mixes with the cyanide waste previously treated at *p*H 11.0 with gaseous chlorine in the other small tank. All other wastes, predominately acid, are led to the center tank and mixed. Thus, some neutralization takes place and sufficient lime is added to control the effluent from the center tank at *p*H 7–8. The chemical feed is controlled by a *p*H electrode which paces the feeder. No settling takes place in these tanks since high speed mixers are used to keep the liquid in motion. The precipitation and clarification takes place in lagoons each having in excess of one week's storage capacity. The characteristics of the effluent from this treatment have been very satisfactory. The silver plating at this plant has now increased to the point where ion exchange recovery equipment is to be installed.

CONCLUSION

New England is fortunate in having an ample supply of water for both domestic and industrial purposes. However, at the rate of growth of our population and our industry, it will soon be necessary for industries to depend on the re-use of water for many purposes. Many domestic as well as industrial water supplies already contain detergents and other chemicals used in cleaning and laundry operations.

The control of industrial wastes so that the re-use of water is possible is now a necessity. The former method of disposal of wastes by dilution is no longer possible. It is urgent that we salvage and return to our processes every material that can cause contamination of our waters so that our waste treatment costs will be within economic bounds.

I. Laird Newell received his MS degree from Trinity College and has been research chemist and consulting engineer with the Henry Souther Engineering Company for over 30 years. He is now president of the company. He holds a number of patents covering metal finishing processes.

Mr. Newell has received an award of the New England Water Works Association for research on corrosion and has been the chemical engineering member of the board of registration for professional engineers and land surveyors since 1951, and is presently the board chairman. He has been State Chemist for Connecticut since 1955. A new member of the AES, Mr. Newell has been doing research on the effect and control of stress in electrodeposits for a number of years and he presented a paper on the effect of several organic addition agents on stress at the 1956 Annual Convention of the AES.

A NEW COBALT-NICKEL SULFAMATE BATH

by IGNATIUS TSU*

ABSTRACT

A new sulfamate bath for electroplating Co-Ni films having a wide range of magnetic properties is described. This new plating bath has a relatively good throwing power. Boric acid, which is normally used in sulfamate baths as a pH buffer, is not needed in this new sulfamate bath. The concentration of chloride ions in the plating bath is particularly critical, because the activity of these ions is influenced by high concentrations of sulfamate ions. Co-Ni films, with high coercive forces (Hc), may be plated cathodically

ELECTROPLATED Co-Ni FILMS ARE EXTENSIVELY used as magnetic recording media. Their advantages over oxide coatings include simplicity of preparation, and the comparative ease of obtaining a very wide range of magnetic properties and film thicknesses. These advantages are extremely important in magnetic recording since it has been shown that the film must be thin, have a high coercive force (Hc), and a low bulk magnetization in order to increase the amount of magnetic information that can be stored in a given area.[1]

Several types of plating baths can be used to electrodeposit Co-Ni films. These include a Watts type (with additions of Co^{++});[2-5] a hypophosphite type (containing $H_2PO_2^-$);[6] and a sulfamate type.[7] The objective of this paper is to describe a sulfamate bath that offers a number of advantages in its use.

The Watts type Co-Ni plating bath is commonly used with superimposed ac[2-5] or periodic reverse current[8] in order to increase the coercive force. The coercive force can also be increased by increasing the bath *p*H.[9] In a Watts bath however, a *p*H factor as high as that used in the sulfamate bath herein described would result in objectionable precipitation.

Co-Ni films plated from a hypophosphite bath contain a percentage of phosphorus.[10] Although the phosphorus can be dispersed throughout the Co-Ni matrix or combined with Co or Ni to form phosphides (Ni_3P), the magnetic properties are critically dependent on the state of dispersal of the phosphorus; and this is dependent on the bath *p*H; therefore, use of *p*H buffer is required. In addition, the hypophosphite bath must be used at elevated temperatures, otherwise the deposit may be stressed and unsound.

The sulfamate bath, however, does not require the careful use of buffers or elevated temperatures in order to control the magnetic properties of the film. In addition, the magnetic properties of films plated from the sulfamate bath can be varied by simple variations of Co/Ni only.

EXPERIMENTAL

The first attempt to obtain a Co-Ni film with high coercive force was to plate from a Watts type bath having a high *p*H. In order to prevent intolerable precipitation, various complexing agents were investigated as possible additives. These complexing agents were amine, citrate, EDTA, glycolate, pyrophosphate, and tartrate. A typical bath formulation in the study of these complexing agents was:

$CoCl_2 \cdot 6H_2O$	80 g/l
$NiCl_2 \cdot 6H_2O$	20 g/l
Complexing agents	
*p*H = 4 to 6 (KOH, HCl)	
Current Density = 10 to 50 asf	
Temperature = 60 to 90C	

Experimental data indicated that this bath formula was not capable of producing Co-Ni films with coercive forces higher than 200 oersteds.

It was desired to obtain from a Co-Ni bath, less complicated than the Watts type, Co-Ni films with coercive forces greater than 300 oersteds. Attention was therefore directed to a sulfamate plating bath.

The first attempt at plating from a sulfamate bath, was made using the formula below, with the addition of boric acid.

Boric acid of course, is commonly used as a *p*H buffer in Watts type baths and in all types of sulfamate baths in industry. This first attempt however, yielded a film with a coercive force of only 275 oersteds.

The same formula was used in another attempt, and this time the boric acid was removed. The film plated from this

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bath had a coercive force of 500 oersteds. Boric acid was then eliminated from the bath composition.

Co^{++}	4.96 g/l
Ni^{++}	14.85 g/l
$NH_2SO_3^-$	59.40 g/l
Cl^-	6.65 g/l
*p*H (KOH)	6.5–6.8
Temperature	Room Temperature
Typical Plating Voltage	1.7 volts
Cathode Efficiency	100% (at 4.5 asf)

This plating bath may be made up by using either cobalt chloride and nickel sulfamate, or cobalt sulfamate and nickel

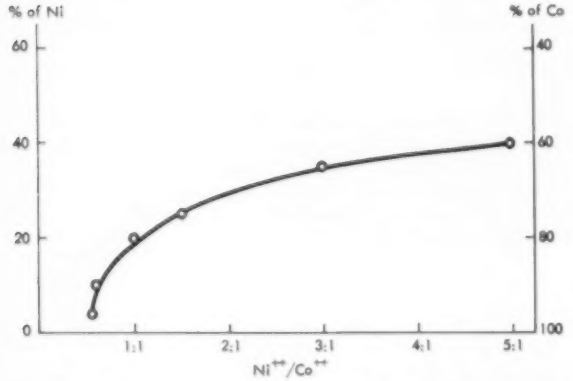

Fig. 1. Co-Ni Composition vs. Ni^{++}/Co^{++} Ratio in Solution (Bath pH—6.5, Plating Voltage—1.7v)

chloride. Excess sulfamic acid was used for furnishing $NH_2SO_3^-$ to a suitable concentration. Bath precipitation in this *p*H range of 6.5–6.8 was not found to be a problem. Hull cell measurements indicated good throwing power, and a bright deposit could be obtained in the current density range of 1 to 5 amperes per square foot.

During the investigation of the properties of this newly developed sulfamate plating bath, the bath formulated by R. C. Barrett[7] was evaluated. Barrett's bath is as follows:

Cobalt Sulfamate	225 g/l
Nickel Sulfamate	225 g/l
Boric Acid	30 g/l
Magnesium Chloride	15 g/l
Wetting Agent	375 mg/l
*p*H = 2.0–4.0	
Temperature = Room Temperature	
Anode = 80Co, 20Ni	
Current Density = 15–30 asf (dc)	

The Co-Ni films plated from this bath have an alloy composition of 80Co–20Ni. For a film thickness of 0.1 mil, the coercive force range is 200–290 oersteds and Br $\geq$ 8000 gausses. Measurements made with a Hull cell however, indicated that this bath had relatively poor throwing power and unsatisfactory anode dissolution.

It is well known that the limiting current density at the cathode in a chloride electrolyte is about twice that in a sulfate electrolyte;[11] and also that the presence of chloride ions will facilitate the anode dissolution, thereby preventing passivity in plating.[12] The relatively low throwing power of Barrett's bath may therefore be explained by the lack of activity of chloride ions caused by too high a concentration of sulfamate ions in the plating bath.

To determine this influence, titrations of Cl^- were made against the 0.2N silver nitrate solution as a function of sulfamate ions present in the plating bath. Experimental data indicated that when the sulfamate ion concentration was increased to a degree comparable to Barrett's bath, the volume of silver nitrate solution required to reach the end-point in the titration of Cl^- was increased 6 times. The sulfamate ion concentration in Barrett's bath is approximately 345.16 g/l as compared to 59.40 g/l present in this new sulfamate bath.

To determine the cathode efficiency of this new sulfamate bath, the film deposits were quantitatively determined for cobalt and nickel. The cathode efficiency therefore, was calculated by comparing the amount of cobalt and nickel deposited against the theoretical amount in a given ampere-hour. High cathode efficiency was noted despite the low ionic strength of Co and Ni in solution.

DISCUSSION

It is well known that the factors that can be expected to control the magnetic properties of a Co-Ni film are: alloy composition, preferred crystal orientation, impurities in the film, and demagnetizing effects (which can be accentuated by decreasing film thickness).

Normally, a Co-Ni film of 80Co–20Ni, can be plated if the ratio of Co^{++} and Ni^{++} in solution is 1:1. In order to produce a hard magnetic coating with low magnetization (low B_r), the percentage of Co in the film should be lowered.[13] A reduction of B_r will reduce demagnetizing effects which limit bit density. Improved recording characteristics may therefore be obtained with lower Co content in Co-Ni films, if this will not result in a structural change.

The alloy composition of films plated from the new sulfamate bath can be varied by varying the Co/Ni ratio in the solution. Figure 1 illustrates the dependence of Co-Ni alloy composition in the film on the Co/Ni ratio in the solution.

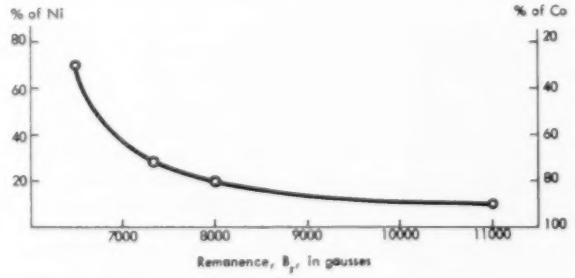

Fig. 2. Remanence (B_r) vs. Alloy Composition.

The dependence of remanence (B_r) on alloy composition is represented in Fig. 2.

The characteristic increase in coercivity of films plated from Watts type baths with increasing *p*H, is also evidenced in this new sulfamate bath. This is demonstrated by the data presented in Fig. 3. Quinn[9] found that by increasing the bath *p*H to more than 3 in Co-Ni Chloride solutions, the pre-

ferred orientation in the film will occur and Co and Ni oxides will be created in the film. The increase in coercive force cannot be explained by alloy composition changes due to the effect of a bath *p*H below 3. The fact that Co-Ni films exhibit preferred orientation when bath *p*H is greater than 3, seems to explain this increase in coercive force.

Boric acid does not seem to be necessary in this new Co-Ni sulfamate bath as a *p*H buffer. And it is not possible to electroplate a Co-Ni film with coercive force greater than 290 oersteds when boric acid is present in the new Co-Ni sulfamate bath. However, the mechanism by which the coercive force is reduced in the presence of boric acid is not understood. Since the coercive force of Co-Ni films increases as the bath *p*H is increased, the reduction of coercive force in the presence of boric acid may possibly be due to the reduction of *p*H at the cathode film.

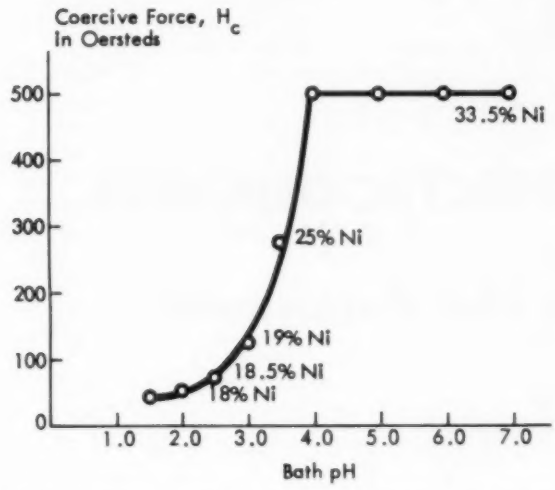

Fig. 3. Coercive Force (H_c) and Alloy Composition vs. Bath pH.

Experimental evidence seems to indicate an interaction between chloride and sulfamate. Apparently, the "free" chloride in the bath decreases as the sulfamate is increased. It is interesting to note that there is approximately six times more sulfamate ions in Barrett's bath than those in the new Co-Ni sulfamate bath, and six times more volume of silver nitrate was needed to reach the endpoint in a chloride titration when sulfamate concentration was increased to that comparable to Barrett's bath.

The coercive force of Co-Ni films plated from the new sulfamate bath is independent of the film thickness providing it is thicker than 0.1 mil. This behavior may be expected due to the hexagonal structure of the film and its crystal orientation of 110 perpendicular to the plane.

SUMMARY

A new Co-Ni sulfamate bath has been described from which films having a wide range of magnetic properties may be electroplated. Boric acid is not needed for *p*H control in this new sulfamate bath; it does, however, influence the coercive force of the deposit. The presence of chloride ions in the sulfamate bath is important, as it will increase the limiting current density at the cathode. Apparently a high concentration of sulfamate ions in the plating bath is undesirable, as it influences the activity of the chloride ions.

ACKNOWLEDGMENT

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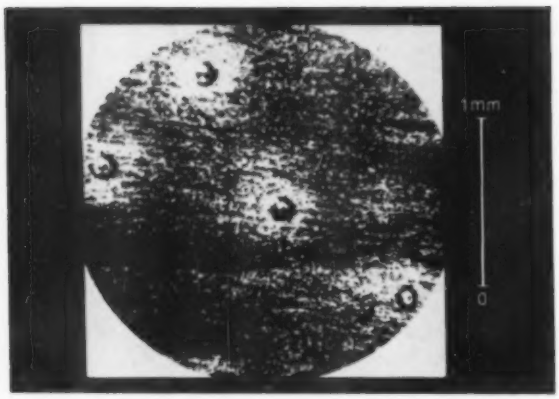

Fig. 1. Hydrogen pores

THE POROSITY OF ELECTRODEPOSITS

Causes, Classification and Assessment

by ARTUR KUTZELNIGG*

ABSTRACT

As the cavities encountered in electrodeposits may belong to quite different types, a system of classification and symbols is suggested to avoid misunderstandings. The system is based on distinguishing between pores and cracks, on whether they extend from the basis metal to the surface of the deposit or are bridged, and on their size. The transverse and masked cavities are further divided into several types. The different causes of porosity are reviewed and the faults arising are classified.

The principal methods of assessing porosity are briefly discussed. None of them is entirely satisfactory for routine testing. For detecting transverse pores in nickel coatings the non-corroding agent α-nitroso-β-naphthol is suggested, which produces green spots where the steel base is exposed.

INTRODUCTION

In the early days of nickel plating, pits visible with the naked eye were not uncommon. (Fig. 1.) A considerable amount of basic work on this subject was done in England as early as in the thirties by Macnaughtan[18] and Hothersall[11] and coworkers and in France by Cymboliste.[5] The main causes of porosity were enumerated and quite efficient means were found to avoid pores in nickel deposits. As a matter of fact, in recent years several authors have stated that they were unable to detect any pores at all in nickel deposits of present day trade quality by the current microscopical examination of cross sections.[19, 29]

Nevertheless, nickel-chromium deposits on automotive parts continued to corrode quite badly in spite of an increase in thickness of the coating. Again the conception of porosity was put forward to explain the unexpected failure of the nickel deposits. New methods were developed and older ones revised for seeking fine invisible pores. However, a clear correlation between the pores detected in the nickel deposit and the rate of corrosion could not be established.

Following the many discussions about the corrosion of chromium plated parts, at last it became evident that it is not only that the nickel is involved but also the chromium layer which gives trouble because of its hitherto neglected porosity[3] (Fig. 2k).

Nickel deposits without a chromium topcoat are also prone to a pitting type corrosion by the action of sulfurous acid,[14, 17] (Fig. 2q), but porosity arising in the plating process nevertheless remains of importance for nickel and for other cathodic coatings. Porosity arising from any cause undermines the protective value of most coatings and the object of this paper is to show the diverse forms that pores may take, to provide a classification system for these forms and to suggest the causes that give rise to them.

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CAVITIES IN ELECTRODEPOSITS

The term "porosity" is not always used in the same sense. Therefore the author has suggested some definitions,[14] which in somewhat fuller form are presented here as a basis for international discussion.

> By pores in coatings are meant cavities, which depend on the method of formation of the coatings, and which are filled with air or other foreign matter (other gases, fluids, solids).

Two main kinds may be distinguished:

1. Transverse pores. They extend through the coating from the basis metal to the surface of the deposit. Transverse pores may be orientated perpendicular (Fig. 2a, b) or oblique (Fig. 2c) to the surface or may have a tortuous shape (Fig. 2d). Further, the shape of the transverse pores may be of the channel (Fig. 2a)—or the hemispheric (Fig. 2b) type.

2. Masked or bridged pores. These do not extend through the coating. They may start at the surface of the basis metal but become bridged and do not reach the surface of the deposit (Fig. 2e), or they may start within the deposit and become bridged (enclosed pores) (Fig. 2f). Also there are pits, not reaching the surface of the basis metal ('dead end pores')[20] (Fig. 2g).

Masked or bridged pores are likely to be transformed into

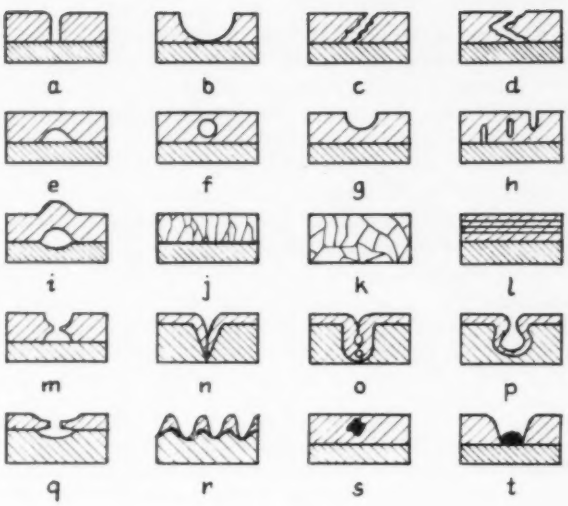

Fig. 2. Types of cavities

TABLE 1

CAVITIES IN DEPOSITS

Size	Pores (P)						Cracks (C)						
	Transverse Pores (PT)			Masked Pores (PM)			Transverse Cracks (CT)				Masked Cracks (CM)		
	Perpendicular Fig. 2a, b	Oblique, Fig. 2c	Tortuous, Fig. 2d	Bridged, in contact with the base Fig. 2e, h	Enclosed Fig. 2f, h	Surface pits (dead end pores) Fig. 2g, h	Perpendicular	Oblique	Tortuous	Along the grain boundaries, Fig. 2j	In contact with the basis, bridged	Enclosed	Surface cracks Fig. 2k
	1	2	3	4	5	6	1	2	3	4	5	6	7
Gross	11	21	31	41	51	61	11	21	31	—	51	61	71
Small	12	22	32	42	52	62	12	22	32	—	52	62	72
Submicroscopic	13	23	33	43	53	63	13	23	33	43	53	63	73

Hemispherical type Fig. 2b	Channel type Fig. 2a	Hemispherical type	Channel type Fig. 2h	Spherical type Fig. 2f	Channel type Fig. 2k	Hemispherical type Fig. 2g	Channel type Fig. 2h
111	112	411	412	511	512	611	612
121	122	421	422	521	522	621	622

transverse pores by corroding agents. Therefore they also may be named 'potential pores.'

3. Physical Aspects of Pores. A further characteristic suitable for classification is *size*. There are

gross pores, visible with the naked eye

small pores, only visible by examining with a tenfold magnifying glass or a microscope

intrinsic or *submicroscopic* pores which are not discernible by the low power microscope.

Several types of pores may combine, e.g. channel type and spherical type pores (Fig. 2m).

Bridged pores, located on the surface of the base metal and originally filled with electrolyte, may give rise to 'blisters,' if the deposit is locally lifted by the pressure of hydrogen generated by interaction of the basis metal and the solution (Fig. 2i). Blisters may also be produced by rubbing poorly adherent deposits.

4. Cracks (Fig. 2k) may be regarded as pores much extended in a direction parallel to the surface. Cracks may also be divided into transverse cracks, enclosed cracks and surface cracks. They may further be gross, small or submicroscopic. An extreme case of the last type are the boundaries of the crystallites building up the deposit (Fig. 2j). The most common example of cracks is represented by the pattern seen in bright chromium deposits at large magnification (Fig. 2k).

In addition to pores and cracks, there can be stratifications (Fig. 2l) which may be better understood as lamellar discontinuities, in general these discontinuities differ in composition from the main part of the deposit. They are very common in bright electrodeposits.

Table I summarizes the types of cavities just discussed. Each type is given a symbol comprising two capital letters and two or three numbers.

In Fig. 2 the main types are represented schematically.

CAUSES OF POROSITY

It may be useful to review briefly the causes of the various types of porosity in electrodeposits. The first group and, as is believed, the most important one has its origin in the irregularities of the basis metal.[7, 10, 11, 22, 26, 27] It is clear enough, though not always realized, that a thin deposit of say one-tenth of a mil on a substrate having discontinuities and irregularities in the range of mils cannot be expected to be free from pores (Fig. 2a). Indeed, steel surfaces sandblasted and nickel plated to give a deep matte finish, would completely rust in a short time. The smoother the surface of the basis metal, the higher is the quality of the coating deposited on it. Experiments have shown that nickel layers, only 2 microns thick, if deposited on a highly polished surface are practically free from pores and of remarkably better protective value as compared with coatings 10 microns thick on a commercial grade steel base.

Recently, extensive work was done by Raub[23] on microthrowing power, using surfaces with V- and U-shaped notches. Figure 2n, o, gives two examples of porosity he encountered. Another type of trouble may arise by pores in the basis metal, e.g. a casting or a powder compact part. Though the deposit itself may be free of pores, the resulting pocket filled with electrolyte is the cause of trouble known as blooming out (Fig. 2p, Fig. 3).

Table II summarizes the troubles caused by surface irregularities.

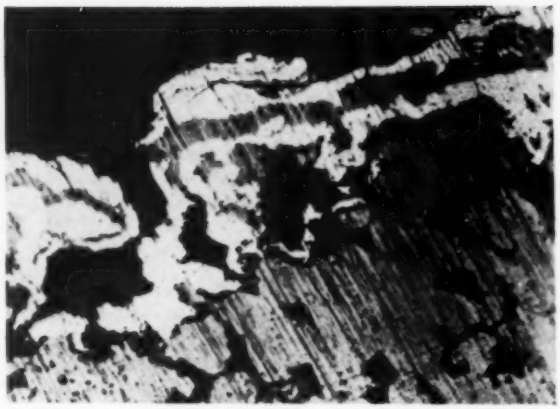

Fig. 3. Porous powder metal part (gray), coated with silver (white)—copper (gray)—silver (white).
Courtesy Dr. H. Schreiner, Nurnberg

The pores of the second group (Table III) are caused by local screening of the surface to be coated. Non-conductive matter is not easily covered by metal and fairly thick layers are needed to bridge the resulting gaps.

Hydrogen pits were mentioned in the introduction (Fig. 1). They are caused by bubbles of hydrogen, that persistently adhere to the surface. In general, hydrogen pits do not start from the basis metal and therefore, though visible to the naked eye, are not necessarily indicated by reagents which do not corrode the nickel coating.

By correcting the *p*H, filtering the solution and the use of appropriate wetting agents, it is usually possible to avoid this kind of porosity.

Similar troubles may be caused by bubbles of air which are introduced by the filter pump, or set free by the warming of cold solutions saturated with air. Another common source of porosity is settlement of insoluble particles, for example, particles from the anodes (anode sludge) settling on the metal surface. This difficulty is usually overcome by anode bags. Oil introduced into the solution may cause serious troubles.[26]

A third group of cavities is caused by faulty conditions of

TABLE II

Fault	Source	Symbol of Cavities
Rough surface	Lack of polishing or too coarse polishing, sand blasting, overpickling	PT, PM
Oxide inclusions	Mill scale, alumina, silica in killed steel	
Slag lines	Slag particles, rolled in	
Notches, scratches on the surface	Handling and mechanical treatment	PT, PM CT, CM
Pores in the material to be coated	Castings, powder compacts	Secondary pores (Fig. 2p and Fig. 3)

TABLE III

PORES CAUSED BY LOCAL SCREENING OF THE SURFACE

Kind of Screening	Source of Trouble	Symbol
Gas bubbles, (hydrogen, air)	Ni: too high a *p*H, lack of wetting agent	PT 111 PM 411 PT 121 PM 511 PM 521 PM 611 PM 621
Fat, oil	Residues of polishing compounds, oil introduced by compressed air	PT 11 PM 41
Graphite, carbon	Cast iron, overpickled steel (Fig. 2t)	PT 12 PM 52
Abrasive grains	Residues of polishing compounds (Fig. 2t)	PT 12 PM 52
Loose metal particles	Slivers from polishing, shavings, metal powder	PT 11 PT 12
Anode sludge	Insoluble residues from the anodes	PT 12 PM 52
Suspended matter	Dust from grinding department, precipitated gypsum	PT 12 PM 52
Hydroxides or basic matter	Precipitation from the solution	PT 12 PM 52 PT 13 PM 53

deposition, or by damage after plating (Table IV). For fuller consideration of the effects of microthrowing power in deposition on v rious surface profiles, reference should be made to the work of Raub.[23]

Some examples of the practical significance of the faults listed in Table IV are as follows. Crack-free chromium deposits are very promising for better performance of nickel against corrosion in industrial atmosphere. Scratching through thin coatings after plating is believed to be a frequent cause of failure when soft metals, e.g. tin are concerned. The danger of corrosion pitting during the storage period of nickel-plated goods in laboratory or shop atmospheres should be borne in mind.

TABLE IV

Fault	Source	Symbol
Incomplete covering of the surface	Poor macro- or micro-throwing power of the solution	PT 1 (Fig. 2n, o, r)
Cracking	Internal stress in brittle deposits (chromium)	CT 1 (Fig. 2k) CM 7
Scratches	Damage after plating by scouring and scraping	CT 1 CM 7
Polished through spots	Too thin a coating	CT 1
Chemical attack after deposition	Corrosion during storage	PT 121 (Fig. 2q)

INCLUSIONS

It is well known, that non-metallic matter can be deposited together with a metal. The analysis of deposits discloses the presence of oxygen, carbon, nitrogen, chlorine, sulfur and other non-metallic elements. Probably they are included in fine dispersed form as oxides, hydroxides, sulphides, basic matter or as adsorbed organic compounds. Such inclusions may act just like pores and allow the admission of corroding agents to the basis metal. According to the definitions given here, all the defects due to pores and inclusions (Fig. 2s) are treated as porosity problems. Unfortunately there exists very little knowledge about the way in which foreign matter is taken up by the metallic deposit. In any case, the inclusions which are not visible to the naked eye belong to class PT 3, PM 3, or CT 3, CM 3.

When the Ferroxyl test is applied to relatively thick nickel coatings, spots of mustard like color appear.[16] Obviously these spots have their origin in a reaction between some sort of nickel salt formed or included in the deposit, and the ferricyanide. An alternative explanation might be to assume "weak spots" in the coating derived from disorder states, having higher energy than the main part of the surface.

POROSITY AND THICKNESS OF THE DEPOSIT

There is no reason why an electrodeposit should inherently be porous. Deposited on a smooth and thoroughly cleaned

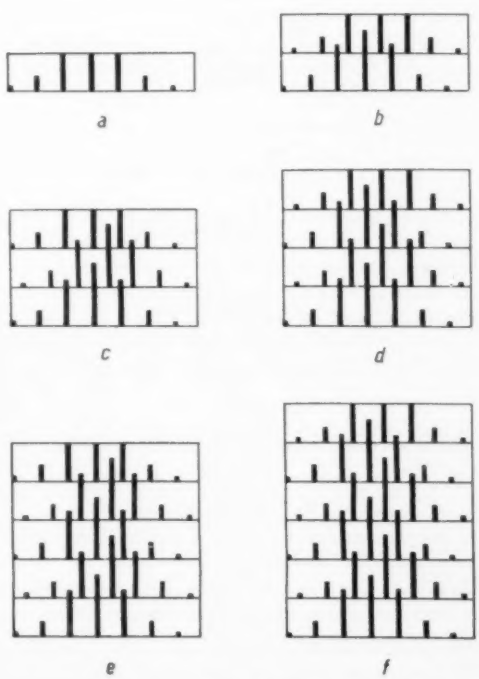

Fig. 4. Distribution of pores (deduced)

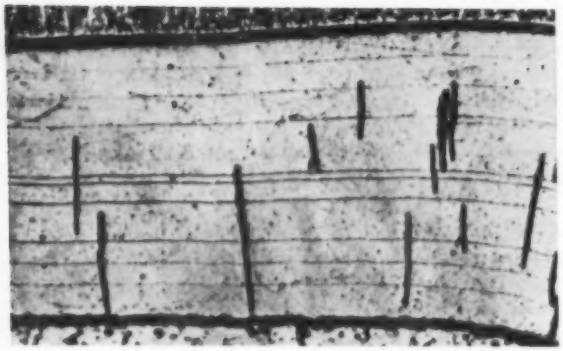

Fig. 5. Pores in a sulfamate bath-nickel coating. According to Fanner and Hammond.[9]

surface from a solution of appropriate composition and correctly adjusted *p*H, containing wetting agent and continuously filtered, the anodes bagged, nickel coatings of the order of 2.5μ may be found free of pores.[11] Moreover, extremely thin nickel layers of the order of 70 Å deposited on highly buffed brass showed no signs of porosity when examined by the electron microscope technique.[15] In practice, a certain degree of porosity cannot be avoided. When the porosity has its origin on the surface of the basis metal, the deposit will ultimately bridge the gaps, and the number of pores extending through the deposit decreases as the coating thickness increases. This agrees well with common experience.[30] Coatings 25μ (1 mil) thick in general are practically free from transverse pores. On the other hand, as we have seen, the defects do not originate solely from irregularities of the basis metal but from other sources too. There thus results a distribution of pores, (including the masked ones) as deduced in Fig. 4[15] and actually met with in certain cases (Fig. 5). With this conception in mind, it is possible to explain the somewhat unexpected fact that nickel deposits of say 6μ may show more blue points, when tested with the Ferroxyl reagent, than deposits of 3μ. Apparently, certain masked pores are transformed to transverse pores by the corroding agent. For more detail see ref. 16.

THE ASSESSMENT OF POROSITY

First of all it is necessary to distinguish between two different approaches, the one aiming to indicate the local distribution of pores and the other to give a measure of the total porosity without identifying the pores. Physical, chemical and electrochemical techniques have been developed for these purposes. Unfortunately none is fully satisfactory at the present time from the viewpoint of routine testing.

METHODS INDICATING THE TOTAL POROSITY

a) Physical Methods. A team of investigators,[5, 23] succeeded in measuring the permeability to helium of nickel foils, peeled off from the basis metal and free of gross porosity. Unfortunately, the 'intrinsic porosity' found by this way, (PT 13, PT 23, CT 43) (Fig. 2j) obviously bears no correlation to the protective value of nickel deposits.

b) Chemical Methods. Any reagent attacking the basis metal exposed at the pores and producing a solution suitable for colorimetric analysis may be used to obtain a relative measure for the total porosity. (PT, CT, plus eventually also a part of PM and CM.)

Of course, the methods belonging to this group are more or less arbitrary. For tin coatings on copper, a solution of ammonia (2 per cent) and ammoniumpersulphate (1 per cent) was suggested, for tin coatings on steel a solution containing acetic acid (10 g), ammonium thiocyanate (2 g) and hydrogen peroxide (10 g) in one liter of water.

c) Electrochemical Methods. The techniques developed by Shome and Evans[25] and by Clarke and Britton,[4] although very promising for basic research are not suitable for routine tests.

METHODS ABLE TO SHOW THE LOCAL DISTRIBUTION OF PORES

Physical Methods

The photographic technique[21] is confined to foils peeled from the underlying metal and reveals only pores transmitting light when vertically irradiated. (PT 11, PT 12, but not PT 21 or PT 31, see Fig. 2a, b, c, d.)

The autoradiographic technique[21] can only be considered as a research tool. Transverse and, to a certain degree, masked pores are revealed (PT, PM, CT, CM).

Chemical Methods

Only nickel deposits will be considered. A technique widely used in the past to assess the porosity of nickel deposits on steel, known as the 'Ferroxyl test,' was investigated by the German Standard Institution, because of doubts about the reliability of the test.

A report on the results was published recently.[16] The investigation substantiated previous work which showed that solutions containing $K_3Fe(CN)_6$ and NaCl attack the nickel deposit. Therefore the blue spots rising from the test are not due only to transverse or masked pores but also to pitting of the deposit. Though the conditions of test were defined very thoroughly for the comparative test, the reproducibility of the results was very poor. For this reason it was considered unwise to recommend the use of the Ferroxyl test for assessing nickel deposits on steel.

Some years ago,[12] the author suggested as a test for the porosity of nickel and tin coatings on steel, application of a reagent paper impregnated with α-nitroso-β-naphthol. The presence of iron is indicated by a green coloration and nickel does not react with this reagent. For this reason the α-nitroso-β-naphthol or "Porotest"-paper reveals transverse pores only. The small numbers of pores, indicated in commercial grade nickel coatings as compared with the indications of the Ferroxyl test, led to some scepticism especially when the opinion was held that the corrosion of nickel deposits was caused by its initial porosity. As was pointed out in the introduction, this in fact is not always the case. Recent experiments showed that for all nickel coating discontinuities at which acid copper solution rubbed on to the surface would produce a bright copper flash, green spots were formed on the Porotest-paper. (See Fig. 6.)

As compared with the cupric sulfate test, the test with α-nitroso-β-naphthol is non-destructive and gives a more easily visible result. The Porotest-paper is prepared by impregnating strips of filter paper with a solution of one gram α-nitroso-β-naphthol in one liter of methanol and drying in the air. Before use, the paper is soaked in distilled water. After per-

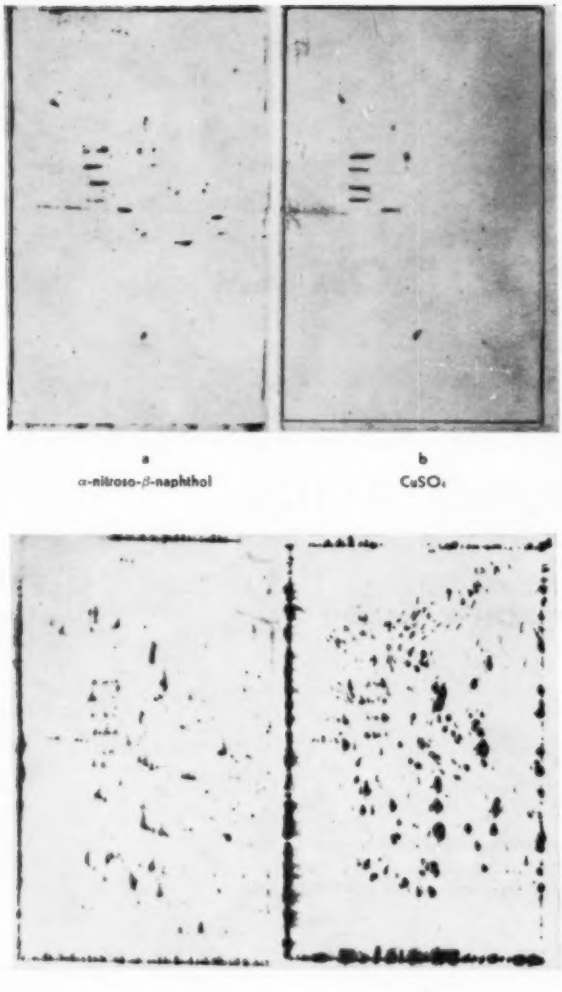

Fig. 6. Porosity tests with nickel coated steel strips successively carried out in the same position (0.5 μNi).

formance of the test, the surface of the coating may be washed with acetone.

Finally, it must be made clear that the practical importance of porosity tests depends on circumstances. When the relation between porosity and resistance to corrosion is well established, a routine test of short duration would be a very useful tool for predicting the behavior of plated articles under practical exposure conditions. Unfortunately, no exact relation can be established for nickel deposits on steel. Therefore, in this special case at least it would be wiser to base predictions about the lifetime of plated parts on the results of corrosion tests rather than on porosity tests. As far as industrial atmospheres are concerned, tests with sulfurous acid and humidity seem most promising to the author.[1, 6, 13]

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DEPOSITION OF IRON FROM SALTS OF FLUORO ACIDS

by JEAN H. CONNOR and VERNON A. LAMB*

ABSTRACT

Iron-plating baths based on ferrous salts of several fluophosphoric acids and of trifluoroacetic and heptafluorobutyric acids were investigated. None of the baths yielded deposits equal in quality to those obtained from the well-known sulfate or chloride baths.

MANY NEW USES FOR electrodeposited iron would undoubtedly be developed in engineering and electroforming applications if ductile deposits could be made from baths operated at room temperature or at moderately elevated temperatures. Such deposits are not obtainable from currently known iron baths. It was therefore desirable to try iron baths based on new salts. In recent years there have become available several fluoro acids, the ferrous salts of which are soluble in water. Iron-plating baths based on these salts were therefore tested. Even though these baths were not satisfactory, the results are reported briefly, to place on record the fact that they have been investigated. Experiments with nickel, cobalt, and chromium salts of some of these acids had been reported earlier.[1]

Solutions of ferrous salts of the following acids were prepared:

**monofluorophosphoric acid (H_2PO_3F)
**difluorophosphoric acid (HPO_2F_2)
hexafluorophosphoric acid (HPF_6)
trifluoroacetic acid (CF_3COOH)
heptafluorobutyric acid (C_3F_7COOH).

Although the fluorophosphoric acids are subject to hydrolysis, their salts in weakly acidic solutions are reported to be quite stable.[2]

The baths were prepared by anodically dissolving iron in a solution of the acid. Ferrous hexafluorophosphate was also prepared by cathodic reduction of a solution of the ferric salt (obtained by dissolving ferric oxide in a solution of the acid). The ferrous fluorophosphate solutions oxidize very rapidly to the ferric form in contact with air, making it necessary to put them in closed containers in which an atmosphere of hydrogen is maintained. The solutions of ferrous trifluoroacetate and heptafluorobutyrate oxidize much less rapidly, and were employed in contact with air. The concentration of ferric iron was maintained at less than 3 g/l by periodic reducing treatments consisting of addition of iron filings and excess acid. The *p*H was raised, as necessary, by electrolyzing at a low current density or by adding sodium hydroxide.

The results are summarized in the table. The best deposits were obtained from the trifluoroacetate and heptafluorobutyrate baths containing boric acid, operated at 90C. However, even these deposits were inferior to those from standard sulfate or chloride baths. In no case was a satisfactory deposit obtained at room temperature. In a few experiments 5 mole-per cent of cobalt was added to the ferrous tri-

* Chemistry Division, National Bureau of Standards, Washington 25, D. C.
** The names recommended for these two acids by Chemical Abstracts are phosphorofluoridic acid and phosphorodifluoridic acid, respectively.

SUMMARY OF EXPERIMENTS ON DEPOSITION OF IRON FROM SALTS OF FLUORO ACIDS

Bath Composition	*p*H	Temp. °C	Cathode current density amp/dm²	Cathode current efficiency %	Description of deposit
1 *M* Fe $(OOCCF_3)_2$	2.0–5.0	room	2	—	Poor deposits Dark-colored, stressed
	3.6	90	2–10	>100	Dark-colored
	4.1	90	2–10		Good deposits*
1 *M* $Fe(OOCCF_3)_2$ 0.5 *M* H_3BO_3	1.8–3.6	room	2–10	>100 at *p*H values >2.4	Poor deposits
	1.8–4.3	90	2–10		Good deposits*
1 *M* $Fe(OOCC_3F_7)_2$	0.8–3.7	room	2–10	105 at *p*H 3.7 and 2 amp/dm²	Poor deposits Dark-colored, stressed
	0.8–1.9	90	2–10	106 at *p*H 1.1 and 2 amp/dm²	Poor deposits
1 *M* $Fe(OOCC_3F_7)_2$ 0.5 *M* H_3BO_3	1.6–3.6	room	2–10	59 at *p*H 3.1 and 2 amp/dm²	Poor deposits Black, in some cases powdery.
	1.6–3.1	90	2–10	119 at *p*H 3.1 and 2 amp/dm²	Good at lower *p*H*
0.75 *M* $FePO_3F$	0.3–2.2	room	2–10	5 to 10	Poor, smutty
	0.3–2.2	90	2–10		Fair at higher *p*H
0.75 *M* $FePO_3F$ 0.5 *M* H_3BO_3	0.4–3.0	room	2–10	10 to 24	Fair at lower *p*H
	1.7–3.0	90	2–10		Fair at lower *p*H
1 *M* $Fe(PO_3F_2)_2$	0.3–2.8	room	2–10	8 to 75	Poor deposits Dark, rough, in some cases powdery
	1.6–2.8	90	2–10		Fair at lower *p*H, but cathode efficiency low

*These deposits, though sound and of good color, are brittle.

fluoroacetate bath but improved deposits were not obtained. All deposits were brittle, even those described as "good" in the table. Many of the dark-colored deposits from the trifluoroacetate and heptafluorobutyrate baths were obtained at cathode efficiencies of over 100 per cent, indicating that large proportions of oxide or of hydrated salts were occluded. The data for the hexafluorophosphate bath are not tabulated, since only a few experiments were run. However, its performance was similar to that of the other fluorophosphate baths.

ACKNOWLEDGMENT

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1960-1961 AES HONORS AND AWARDS BEING READIED FOR CONVENTION ANNOUNCEMENT

Four among the 1960–1961 Branch candidates for AES Honorary Membership were endorsed first by the Honorary Membership Award Committee headed by Dr. Samuel Heiman, then by the Executive Board at its recent Hartford meeting. Consequently the four ratified candidates can be nominated by their respective Branches at the Supreme Society's Annual Meeting, June 22, 1961 for election of not more than three of them by that AES summit governing council, unless said Supreme Society, at will, suspends its recorded policy and chooses to elect all four.

The selection by the AES Paper Awards Committee of 1960–1961 winners of the Society's eleven Paper Awards, including the three recently created, will be announced at the First Business Session of the Supreme Society, June 19, 1961, at the AES's Boston Annual Convention. The Committee is headed by Frank Tirendi, and includes William M. Tucker and Dr. Martin S. Frant.

The choice of the fourth annual winner of the AES Scientific Achievement Award, the Society's highest scientific honor, will be announced at the Grand Opening Session of the AES Boston Convention, June 19, 1961. That selection committee is led by William M. Tucker and includes Dr. William Blum, Myron B. Diggin, Dr. Henry B. Linford, Dr. Louis Weisberg and Dr. Harold J. Wiesner.

The second annual winner of the Charles Henry Proctor Memorial Leadership Award, the Society's highest non-scientific award, will be chosen from among nominees of AES Branches and AES standing Boards and Committees, and will be announced at the Farewell Banquet of the Boston Convention, June 22. Aside from Mr. and Mrs. William Osborne Preston, the donors, the Selection Committee which is headed this year by National President W. Andrew Wesley also includes John P. Nichols, Dr. D. G. Foulke, Samuel S. Johnston, Warren B. Eliot and William M. Robinson.

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PITTSBURGH BRANCH PLANS GALA DINNER/DANCE

The annual Ladies' Night Dinner Dance of the AES Pittsburgh Branch will be held June 10 at the beautiful Churchill Valley Country Club, located off Route 22 east of Pittsburgh. A cocktail hour complete with hors d'oeuvres will precede a fine steak dinner. Immediately after dinner, the platers and their ladies will dance to the "Starlight" music of Baron Elliott, one of the finest orchestras in Pittsburgh.

Richard Cope and William Corr are the co-chairmen for this affair. The Pittsburgh Branch would be happy to have any interested out-of-towners attend the dinner-dance. For further information and tickets contact Richard Cope at the Westinghouse Electric Corporation, Electroplating Projects Department, East Pittsburgh, Pa.

AES BOARD AND COMMITTEE MEETINGS AT 48th ANNUAL CONVENTION, AMERICAN ELECTROPLATERS' SOCIETY • STATLER-HILTON HOTEL • BOSTON, MASSACHUSETTS

SUNDAY, JUNE 18

		Room	Presiding
9 a.m.	Executive Board	Hq. Room	Dr. W. A. Wesley
2 p.m.	Honorary Membership Award Committee	418	Dr. S. Heiman
2 p.m.	AES Scientific Achievement Award Committee	410	William M. Tucker
4 p.m.	Credentials Committee	Hq. Room	Robert L. Garrett

MONDAY, JUNE 19

12 p.m.	Branch Secretaries	Parlor A	John P. Nichols
2:30 p.m.	Editorial Board	Parlor C	John P. Nichols
4 p.m.	Order of Past Presidents	Hancock	S. S. Johnston

TUESDAY, JUNE 20

		Room	Presiding
8 a.m.	Proctor Award Selection Committee	418	Dr. W. A. Wesley
9 a.m.	Educational Committee	440	Ralph H. McCahan
9 a.m.	Membership Committee	436	John J. Bunsic
9 a.m.	Publications Committee	437	Dr. S. Heiman
9 a.m.	Public Relations Committee	438	Arthur G. Pierdon
12 p.m.	Branch Librarians and Educational Committee	Parlor A	Chester G. Borlet
2 p.m.	Midwest Regional Council	434	Leslie L. Diveley
2 p.m.	Southwest Regional Council	436	Myron E. Browning
4 p.m.	Regional Council Chairmen	442	(To be Announced)

WEDNESDAY, JUNE 21

8 a.m.	Research Committee Breakfast	Parlor A	Dr. D. G. Foulke
9 a.m.	Research Committee Meeting	Parlor C	Dr. D. G. Foulke

FRIDAY, JUNE 23

9 a.m.	Executive Board	Hq. Room	Chester G. Borlet

AES NEWS

LIFT! HELP YOUR BRANCH ATTAIN ITS MEMBERSHIP EXPANSION GOAL

OBERLAND ANNOUNCED AS CANDIDATE FOR AES THIRD VICE PRESIDENT

The candidacy of Edward E. Oberland of the Baltimore-Washington Branch, for the office of Third Vice President of American Electroplaters' Society, Inc. (AES) was announced at the Supreme Society's recent Eighth Interim Meeting by Arthur G. Pierdon, a Branch Past President, in behalf of that Branch. Consequently, Mr. Oberland's name, along with any other aspirants subsequently to be announced, will be placed into nomination for that national office at the Annual Meeting of the Supreme Society to be held in Boston, June 22, 1961.

A graduate of the University of Wisconsin, Mr. Oberland is a Chemical Engineer who, for many years, has been associated with the Western Electric Company in Chicago, New York and Baltimore. For eight years, he has been Senior Development Engineer responsible for planning and development in electroplating, metal cleaning and organic coating at the Baltimore plant of that Company.

Long a member of AES, his distinguished record includes long service as a Delegate of the Baltimore-Washington Branch and as an officer of that Branch through the various echelons from Branch Librarian through Branch President. He headed the Branch in 1959–1960.

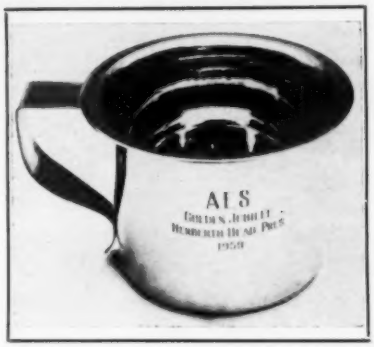
Edward E. Oberland

NATIONAL PRESIDENT TO RECEIVE "POT" IN BALTIMORE-WASHINGTON CEREMONY

The traditional silver-plated "pot" of the Order of Past Presidents of American Electroplaters' Society, Inc. (AES) will be presented to National President W. Andrew Wesley at the traditional ceremony that will be a feature of the Annual Banquet and Dance of the AES's Baltimore-Washington Branch, Saturday, April 15, 1961. The event will occur at the Park Plaza, Baltimore, Maryland.

Launched in 1949, the Order of Past Presidents' "pot" is annually given ceremonially to the Society's National President in the twilight of his administration. Conceived by Past President Kenneth M. Huston, who traditionally makes the presentation at the Baltimore-Washington Branch Annual Meeting, the first awardee was Past President Walter L. Pinner.

Traditionally silver-plated, an exception



was made in 1959 when a gold-plated "pot" was presented to then-President Herberth E. Head who headed the Society during its memorable GOLDEN JUBILEE year.

BROAD ATTENDANCE EXPECTED AT AES RESEARCH CONFERENCE APRIL 24-25

Following in the footsteps of the successful two-day Research Conference held by the AES Research Committee at the National Bureau of Standards in Washington, D. C., December 10–11, 1957, a significant two-day Research Conference will be conducted by the AES Research Committee at the Bell Telephone Laboratories, Murray Hill, N. J. on Monday and Tuesday, April 24–25, 1961 with August Mendizza of the Bell Telephone Laboratories as Chairman of the Research Committee's Arrangements Committee.

As programmed, the first day's sessions will hear reports on Projects 12, 13, 14, 15, 16 and 17. The second day will feature treatment of Projects 18, 19, 20 and conferees will also hear reports concerning proposed new AES Research Projects. There will also be a round-table discussion on the subject of "Needed Electrodeposition Research." The two-day Conference will conclude with a tour of the Bell Telephone Laboratories.

Invited and expected at the Conference will be members of the AES Research Committee, its District Supervisors, its Regional Research Finance Chairmen, its respective Project Chairmen and Project Directors, ranking executives of AES Sustaining Member companies, former Research Committee Chairmen and many other stalwarts who are substantially interested in the status and progress of the AES Research Program and its respective projects in universities and foundations.

AES CONGRATULATES . . .

Congratulations and thanks to the New England Regional Group not only for its arrangement of the Supreme Society's Eighth Interim Meeting but also for the imaginative and effective "Old Timers Night" that followed it. At that event, due recognition for substantial AES membership longevity was given to five respective selected "Old Timers" of the Bridgeport, Hartford, New Haven, Springfield and Waterbury Branches composing that AES regional group.

Allen Ferguson and Richard C. Barrett, both of Bridgeport, served respectively as Chairman and Co-Chairman of the Arrangements Committee of the Interim Meeting. The "Old Timers Night" was arranged by a Committee of New England Branch Presidents headed by William Hyatt Jr. (Bridgeport), and including Walter J. Dyber (Hartford), Harry R. Taylor (New Haven), Alexander R. Salmond (Springfield) and William C. Giesker (Waterbury).

(1) Three informative papers were presented at the well-attended Annual Educational Session. (2) Martin Pollack, Educational Chairman, second from left, presented speakers Robert A. Ehrhardt, Myron B. Diggin and Dr. Harold Narcus. (3) The ladies played Bingo in the afternoon. (4) Left to right, Joseph Haas, Bridgeport Branch; AES National President W. Andrew Wesley; David X. Clarin; Dr. George P. Swift, Boston Branch; Arthur Carlson, Banquet Co-chairman; and Hubert H. Foley, President of Boston Branch. (5) A few of the more than 400 attendants at the Banquet.

TECHNICAL PROGRAM AND ENTERTAINMENT HIGHLIGHT NEW YORK BRANCH ANNUAL MEETING

The necessity to postpone the Annual Technical Session and Banquet of the New York Branch from the originally scheduled date of February 4, because the heaviest snow in years hit New York that day, did not dim the enthusiasm of the AES's first Branch on February 18, when the affair was held at the Hotel Statler-Hilton in New York City.

The original Educational Program was followed except that it was necessary to make a last minute change. Dr. Richard B. Saltonstall, who was to speak on "Duplex Nickel Plating" was grounded in Detroit by the airline strike. Ironically, he was among the few who reached the Statler on the original date. Myron B. Diggin, vice president of Hanson-Van Winkle-Munning Company, graciously consented to talk about "The Plating Industry in Present Day Europe" to fill Dr. Saltonstall's place on the program. The other speakers presented by Martin Pollack, the educational program chairman, were Robert A. Ehrhardt of Bell Telephone Laboratories, Inc. whose paper was entitled "Acid Gold Plating," and Dr. Harold Narcus, consultant, Enthone, Inc. Dr. Narcus discussed the "Role of the Electroplater in the Printed Circuit and Allied Fields." The session proved to be very informative and all of the speakers were roundly applauded. National President W. Andrew Wesley was in attendance, as were members of other AES Branches including Boston, Bridgeport, Dallas-Fort Worth and Newark.

The ladies played Bingo during the afternoon, then attended with the men the Cocktail Party, hosted by members of the MFSA, and the evening Banquet. The four acts of entertainment and the excellent music for dancing during the Banquet brought to a conclusion a memorable occasion.

Jack Weiner was general chairman and he was fortunate to have the assistance of Richard Hartmann, Entertainment; Angelo Amatore and Arthur Carlson, Banquet; Derick Hartshorn Jr., Publicity; Philip P. Bruno, Advertising; Martin Pollack, Education; George Herrmann, Charles Morla and Lester Wolf, Ladies Program; Milton Nadel, Finance; David X. Clarin, Albert Fusco, Ralph Iaguori, Daniel Paris, Elias Schore, Justus A. Stremel and John E. Trumbour, Advisory

LIFT! HELP YOUR BRANCH ATTAIN ITS MEMBERSHIP EXPANSION GOAL

MILWAUKEE AS AES EDUCATIONAL FOCAL POINT, APRIL 29

Always one of the AES educational season's significant events, the Milwaukee Branch's Annual Educational Session and Banquet will be held at the Schroeder Hotel in that municipality Saturday, April 29, 1961. Speakers will include Frank Beuckman, Robert Geisel and D. Russell.

Two important collateral events will also be held in Milwaukee that week-end, namely 1) a meeting of the Midwest Regional Council composed of the Chicago, Milwaukee, Mississippi Valley, Rockford, St. Joseph Valley and St. Louis Branches, and 2) a coordination meeting of the AES's 49th Annual Convention Committee headed by Convention General Chairman Herman A. Tessmann (Milwaukee Branch) aided, as Assistant Chairmen, by Ralph D. Wysong (St. Joseph Valley Branch) and Leonard Weeg (Rockford Branch).

The AES's 49th Annual Convention to be held at the Schroeder Hotel, June 25–28, 1962, is being hosted by the Midwest Regional Council, with the Milwaukee Branch as Host Branch. Chairman Tessmann's coordination meeting of his Convention Committees will be held Friday evening, April 28. The Milwaukee Convention Educational Committee is itself headed by Joseph Andrus (Chicago Branch) aided as Vice Chairman by Vincent Mattacotti (Milwaukee Branch).

GOLD OUTFLOW WORRIES HOWARD GLEIM — IT'S HIS

In its February 12, 1961 Potomac issue, the Washington (D.C.) Post published an interesting, well-illustrated story titled "Gold Outflow Worries Howard Gleim—It's His." That very same Howard Gleim is not only a member of the Baltimore-Washington Branch of American Electroplaters' Society, Inc. (AES) but is also the proprietor of a plating shop in Vienna, Virginia. Confident that the Gleim saga will also merit the interest of other AES members, PLATING MAGAZINE reproduces it below with its appreciation to the Washington Post for permission to do so readily granted.

IN the subterranean depths of the Mayflower Hotel, Howard Gleim works in a Merlin-like atmosphere and does that canny magician one trick better—Howard turns silver into gold.

To be absolutely honest, Howard gold-plates Mayflower silverware and considers this not at all as difficult as replacing the 1000 teaspoons each month that customers "liberate." One of his gold-plated spoons even "disappeared" at a luncheon which the then Vice President Nixon gave at the Capitol for Britain's Queen Elizabeth. The hotel had catered the party.

His most important task is to safeguard the hotel's gold service, complete "from candlesticks to crumbers" and said to be matched only by that at the White House.

Soviet Premier Khrushchev, after dining on the White House gold, insisted on the Mayflower service when he entertained the Eisenhowers at the Russian Embassy. He wasn't to be outdone. Had he known, he could have gone a step further—the hotel has a service for 46 locked away in its safe that is solid gold and not gold-plated silver. Admittedly, the extra distinction is small.

When the hotel entertains visiting royalty, Gleim is ordered to spruce up a glittering array of more than 3000 pieces of gold flatware plus holloware, candelabra, epergnes, platters and vases. Two of the side epergnes bear the signature of Thomure, goldsmith to Louis XVI.

Gleim, trained to the craft by his father who also worked for the hotel, has been the Mayflower's silversmith for the past 24 years. The only hotel silversmith in Washington, he performs his tasks with a series of handmade plating and finishing contraptions and dozens of hammers and files.

While the most romantic portion of his work is the soft burnishing of gold, much of each day is spent in removing dents and scratches from the more utilitarian Mayflower table equipment.

"It's those danged dish-washing machines that do it," he complains.

Out of this conglomeration of equipment will come refurbished utensils ranging from modest coffee shop items to the hotel's gold-plated service.

Vern C. Schaeffer
General Chairman
Empire State Regional Meeting

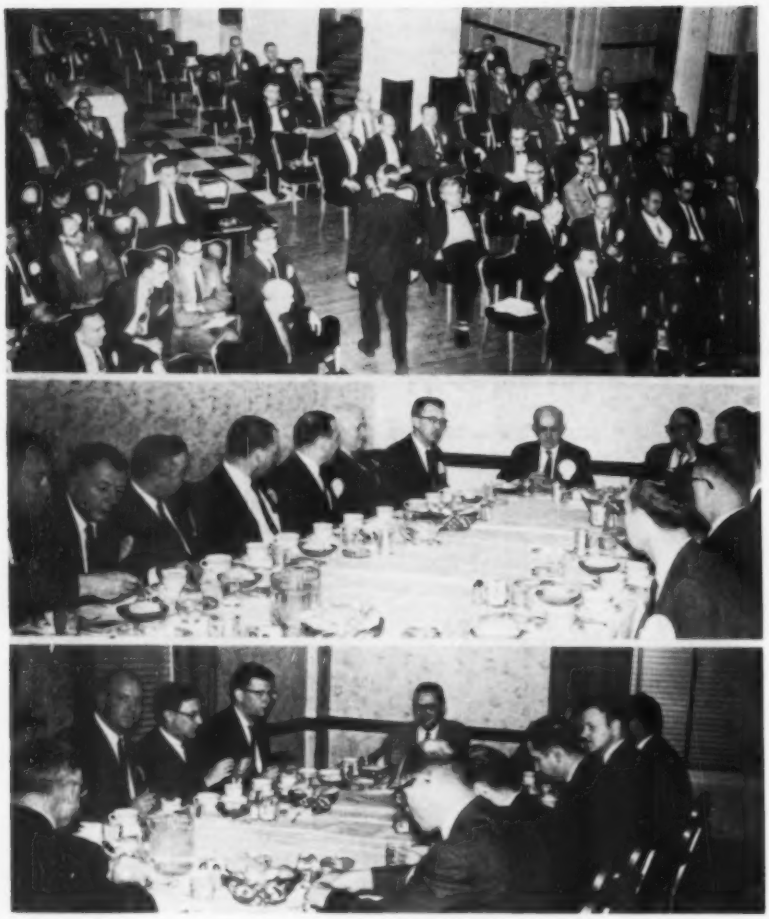
TWO-DAY EMPIRE STATE REGIONAL EVENT TO COMMEMORATE ROCHESTER BRANCH GOLDEN JUBILEE

Back in 1911 when the United States was composed of 46 States, when its population numbered about 92 million and when President William Howard Taft occupied the White House, the National Electro-Platers Association (NEPA), today's American Electroplaters' Society, Inc. (AES), penetrated Rochester, N. Y. and created its third chartered Branch there as companion of the New York (Mother) Branch originated in 1909 and the Philadelphia Branch founded in 1910.

On May 5–6, 1961, that same Rochester Branch will commemorate its FIFTIETH ANNIVERSARY by hosting the two-day Annual Educational Sessions and Banquet of the AES's Empire State Regional Group, to be held at the Manger Hotel, Rochester, N. Y. Collaborating with it in conducting the event will be the five other AES chartered Branches composing that Regional Group, namely the Buffalo, Capitol District, Mohawk Valley, Southern Tier and Syracuse Branches. Vern Schaeffer of the Rochester Branch is General Chairman.

The widely anticipated event will make its debut Friday, May 5, with registration and a "Get Acquainted Party" that will include dancing. On Saturday, May 6, the Educational Session will feature three outstanding technical speakers. King Ruhly of Michigan Chrome and Chemical company, will present a paper entitled "Fluidized Bed Coatings" and R. Scott Modjeska, Scientific Control Laboratories, is to speak about "Plating on Uncommon Metals." David Miller of Deering Milliken, Inc. will make a presentation on Buffing Fabrics. Elsewhere, the ladies will participate in a planned Ladies Program.

The Rochester FIFTIETH ANNIVERSARY observance, and the concurrent Seventh Annual Empire State Regional Educational Meeting will be climaxed Saturday evening by a gala banquet, entertainment and dance.



(TOP) Portion of the attendance at the Tri-State Educational Session. (CENTER) Host Committee and speakers luncheon. L to r, Ralph D. Wysong, William J. Neill, Frank Gentile, William Geissman, Manuel Ben, Frank LaQue, Dr. Charles L. Faust, Walter L. Pinner and William H. Safranek. (BOTTOM) Luncheon meeting of the Tri-State Permanent Committee, Calvin G. Smith, committee chairman, extreme left, back to camera.

COLUMBUS HOSTS TRI-STATE MEETING

The Columbus Branch was host to the Seventh Annual Tri-State Meeting February 4, 1961. The cooperating Branches were Cincinnati, Dayton, Indianapolis and Louisville. The day started off with a 9:30 a. m. Ladies Breakfast and Style Show with an attendance of 40 at the Lazarus Chintz Room and concluded with a Banquet and Dance in the evening. The attendance of both men and ladies was approximately 350.

The high point of the day was the Educational Sessions which started at 10:00 a. m. with an interesting talk by William Geissman, National Lock Co. on *Buffing Zinc Alloy Die Castings—First Phase AES Research Project 18*, and continued with papers by Manuel Ben, General Motors Corp., *Plating on Aluminum*; Walter L. Pinner, McGean Chemical Co., *Developments in Accelerated Corrosion Testing*—Report on AES Research Project 15: Frank L. LaQue, International Nickel Co., *Materials in Outer Space*; Richard J. Anderson, Battelle Memorial Institute, *Journey into Ignorance*. The chairman for the morning session was William J. Neill and the afternoon session was chairmanned by William H. Safranek. The educational session attendance was 110.

The meeting was honored by the attendance of three Past Presidents of the National Society, namely Immediate Past President Ralph D. Wysong, and Walter L. Pinner and William J. Neill.

Mr. Wysong gave an interesting talk at both the Educational Session and Banquet on the necessity of promoting sincere interest in the American Electroplaters' Society and of increasing membership so that the good work of the Society during the past years can be furthered.

A dinner meeting of the Tri-State Permanent Committee was held to outline plans for the Eighth Annual Meeting of the Tri-State to be held in Dayton in the Spring of 1962.

WATERBURY BRANCH CREATES AWARD FOR SCIENTIFIC ACHIEVEMENT

The Waterbury Branch of American Electroplaters' Society, Inc. has reportedly voted to create a plaque for excellence in scientific achievement to be awarded at the Science Fair to be held at Swift Junior High School in Watertown on March 16, 1961. The affair is composed of exhibits prepared by students in the Watertown Junior High School.

"The plaque" according to the Branch's announcement, "will be awarded for sixteen years and will be maintained on display at the school. This represents a constructive step by the Branch to foster scientific interest in young students.

"In addition", the Branch reports, "one of the Branch members, Henry Strow, will deliver a lecture and demonstration on the subject of 'Electroplating' to the youngsters on the evening of March 16th. This will be the first in a series of talks to be delivered by Branch members to pupils in local secondary schools."

DAYTON BRANCH CELEBRATES 15TH ANNUAL MEETING

The Dayton Branch of the American Electroplaters' Society held its Fifteenth Annual Educational Session and Dinner Dance on Saturday, March 4, 1961 at the Hotel Biltmore in Dayton. AES National President W. Andrew Wesley was Honorary Chairman with Larry Hadlock, General Chairman and Robert Fisher, Co-Chairman.

Walter Anderson was Chairman of the Educational Session which featured Dr. Hyman Chessin, director of research, Van der Horst Corporation of America, Olean, N. Y. whose topic was "Adhesion of Electroplated Metals." A. H. DuRose, Harshaw Chemical Company, Cleveland Ohio spoke on "Plating—Art or Science." William H. Safranek, Battelle Memorial Institute, Columbus, Ohio reported on "High Temperature Properties of Electroplates."

The evening festivities included a Joint Suppliers Cocktail Party followed by dinner and dancing.

YOUR PLATING MAGAZINE QUESTIONNAIRE

So as to assure that PLATING MAGAZINE's classification of its subscribers by number, function and geographical location is constantly and consistently up to date for Audit Bureau of Circulations audit, a Return Sheet was recently issued to each subscriber internationally. It is revealing that nearly 50 per cent of such Return Sheets issued were executed and returned by subscribers within ten days of issuance, with the flow, of course, continuing. If you have not yet accomplished and returned yours, your cooperation in doing so promptly will be appreciated by AES and PLATING.

CONSTITUTION AND BYLAW AMENDMENTS PROPOSED BY EXECUTIVE BOARD TO SUPREME SOCIETY

So as to balance the annual income and expense of American Electroplaters' Society, Inc. (AES) without further foreseeable need for operating subsidy from AES reserves under today's economic conditions, the Executive Board, for the Society's financial safety, will propose for consideration of the Supreme Society, AES's summit governing council, at its Annual Meeting to be held in Boston, June 22, 1961:

> That the Constitution and Bylaws of American Electroplaters' Society, Inc. be amended, wherever applicable, so as to provide for an increase in the annual Per Capita Tax paid by Branches and the annual dues of Members-at-Large, to be effective on July 1, 1962 for the fiscal year spanning July 1, 1962–June 30, 1963 and thereafter.

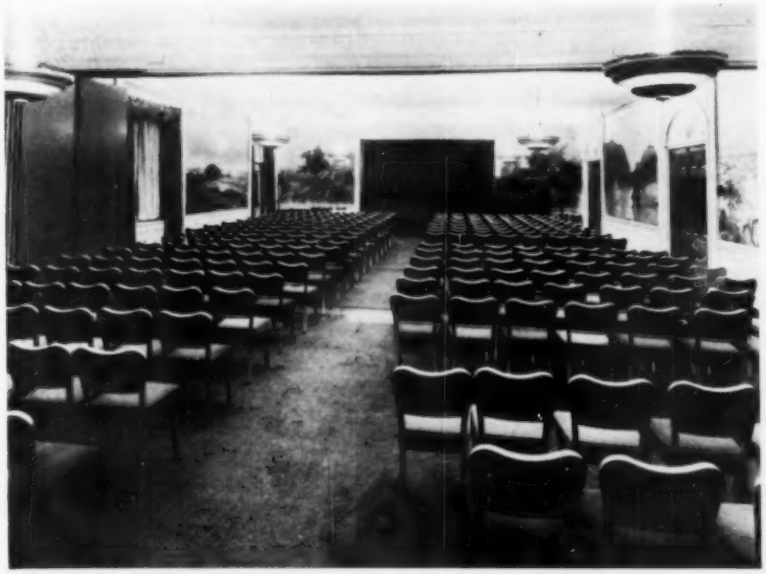
The Executive Board will prepare the Society's operating budget at its April 14–15, 1961 meeting. This will incorporate every possible way and mean of reducing operating expenses without eliminating those AES services now required by the provisions of the AES Constitution and Bylaws. From this budget, the minimum amounts of Per Capita Tax and Dues rate increases consistent with financial stability will be determined and proposed to the Supreme Society at its Annual Meeting.

. The Board, moreover, is also offering the following proposed amendments of AES law:

1. That Part I, Article V, Sections 1 and 3 and Part II, Article VIII, Section 1 of the Bylaws of American Electroplaters' Society, Inc., and wherever else in that instrument affected, be amended so that for each new Active Member there shall be paid by the Branch upon his election, a Per Capita Tax proportionate to the number of quarters remaining of the fiscal year, including the quarter during which he is elected.
2. That Part II, Article IV, Section 1 and Part II, Article V, Section 6 of the Bylaws of the Society, and wherever else in that instrument affected, be amended by changing the title "Librarian" to "Branch Educational Chairman."
3. That the second paragraph of Part I, Article III, Section 13 of the Society's Bylaws be amended so as to read as follows:

   "The purpose of the Publications Committee shall be to study and select subjects relative to the interests of the membership of the Society and consonant with the aims of this Society, which are of sufficient magnitude and timely interest to justify publication in book form. The Committee shall recommend ways and means to the Executive Board of facilitating the collection of material for such a book and shall upon Executive Board approval, select and assist the editor(s) and author(s) for same."

The actual language of the proposed amendments, as prepared and certified by the Law Committee, will be published in the May Issue of PLATING MAGAZINE as required by AES law.



Typical AES Convention meeting room at the Statler-Hilton Hotel, Boston, Mass.

FUTURE MEETINGS

Education is the business of AES. For National, Regional and Branch educational and other AES meetings ahead, see PLATING's section titled FUTURE MEETINGS herein.

IMPORTANT TO AES BRANCHES AND BRANCH SECRETARIES

1. **A Return Sheet listing your Branch's accredited Delegates and Alternate Delegates has or will soon reach you. Via that Return Sheet, you are expected to specify those accredited Delegates and/or Alternate Delegates of your Branch who will be at the Boston Convention to represent it officially in the deliberations of the Supreme Society at its June 19 plenary session and its June 22 executive session. If none of your own Delegates or Alternates definitely intend to attend the Convention, you may select and specify three acceptable choices, in order of preference, from among other of the AES's 59 chartered Branches, thus enabling the Credentials Committee to assign your Branch's proxy to the available one so that it can exercise your franchise in your Branch's behalf. Your Return Sheet to be acceptable *must* be signed by both your Branch's President and Secretary, and should properly reach National Headquarters on or before specified deadline. *References:* AES Constitution, Part I, Article III, Sections 1 and 2, and Bylaws, Part II, Art. VII, Section 1.)**
2. **A complete certified roster of your Branch Members in good standing as at June 30, 1961 must, by AES Bylaw provision, be in the hands of the National Executive Secretary on or before July 15, 1961. That list should include every member for whom your Branch paid Per Capita Tax in the July 1, 1960-June 30, 1961 fiscal year, including all new members, all reinstated members and all members "transferred in" during that period, minus all suspended, all resigned, all died or all "transferred out" members from July 1, 1960 through June 30, 1961. Upon arrival of your Branch list and its reconciliation with National Headquarter's records, your Branch will then promptly be billed by National Headquarters for Per Capita Tax for the fiscal year July 1, 1961-June 30, 1962 (*References:* AES Bylaws: Part I, Article V, Section 3, and Part II, Article V, Sections 4 and 5.)**

Part of the Milwaukee Branch metal finishing exhibit at the Milwaukee Public Museum

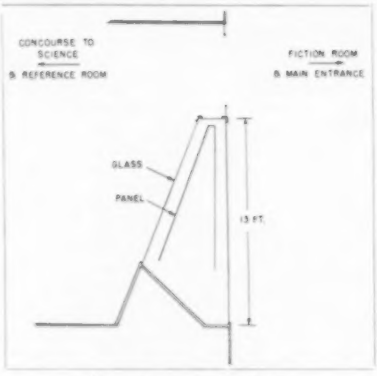
MILWAUKEE EXHIBIT VIEWED BY PUBLIC

by CLINTON HOST, AES Milwaukee Branch

The Milwaukee Branch through its Promotion Committee concluded that the general public was unaware of what was involved in metal finishing and had little idea of the importance and advantages of the various types of finishes. With this in mind the committee decided to set up an exhibit to visually present our wares to the people. The Promotion Committee, chairmanned by Clinton Host, included Stephen Choren, George Fridl, Eugene Johnson, Jerome Stowasser, John Auchter, Phil Ritzenthaler, and E. H. McCoy, who took the publicity photos.

Since popular interest was the main concern, familiar items such as automobile parts, plumbing fixtures, etc., were selected. Such items were collected in the various stages of finishing and some pieces of different finishes were subjected to salt spray to compare their durability.

The prospect of so colorful a display as was planned was welcomed by the Milwaukee Public Museum officials. Edward Green of the Art Department aided greatly in the establishment of the exhibit in one of the museums most attractive and frequented cases. The case could be viewed from three sides and was located in the central concourse between the two principal sections of the Milwaukee Public Library. This concourse is the main access to the reference and science sections of the library, thus the majority



Floor diagram of exhibit

of viewers were college students and men of science and industry in the city. Museum officials have stated that this case received about 3000 viewers a week.

The main attraction of the exhibit is a lucite plating tank with a double oscillating lucite barrel containing nickel plated parts; and the setup is apparently authentic with a green solution, anodes and an electrical hookup.

A folding peg board stand yielding an area of 4 by 16 feet contains such topics as: the advantage of phosphating and/or red-oxide primer on downspouts for homes; the advantage to aluminum of anodizing for durability; the stages involved in the copper-nickel-chromium finishing of zinc-base die-castings; the application of electroforming; and the many various tools of the finishing room, such as buffs, anodes, and plating racks.

Brass letters spelling out the word "electroplating" are plated with the various metals ranging from rhodium to zinc and the price per pound of the metals is given to give a better understanding in the cost of finishing.

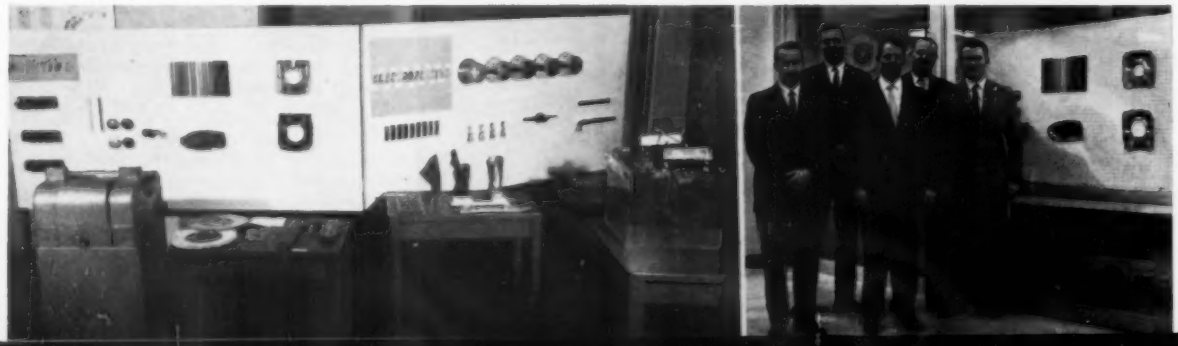
The exhibit showed a lot of popular appeal and served as good advertising for the Milwaukee Branch as well as the industry.

Local newspaper reports publicized the display and many good words were expressed by officials of industry in Milwaukee. Since the display was only temporary in the museum, new areas for exhibiting were considered. It was decided that the next location would be the lobby of the Milwaukee School of Engineering.

♦

The exhibit was transferred to the Metals Laboratory Building of the Milwaukee School of Engineering for an "open house" which the school held for the people of Milwaukee interested in the school. All advertising media, including radio and television, were used by the school to promote the affair. A free dinner was scheduled along with many demonstrations and exhibits. Rainy weather restricted the attendance to something short of a thousand, but all who attended showed great interest in the plating display.

(LEFT) View of the Milwaukee Branch exhibit showing the diversity of the material on display. (RIGHT) Branch Promotion Committee, l to r, George Fridl, John Auchter, Clinton Host, chairman, Jerome Stowasser, Eugene Johnson. E. H. McCoy took the photo. Not in picture, Stephen Choren and Phil Ritzenthaler.



FORTY-EIGHTH ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.

SPONSOR: American Electroplaters' Society, Inc. (AES), American Building, 443-445 Broad Street, Newark 2, New Jersey, and its 59 chartered American, Canadian and Australian Branches.

HOST BRANCH: Boston Branch of American Electroplaters' Society, Inc., itself observing its Fortieth Anniversary as a chartered Branch of AES.

SITE AND HOTEL: Statler-Hilton Hotel, Boston, Massachusetts.

DATES: June 18-23, 1961—in AES's Fifty-Second year. Boston's Mayor has proclaimed this "American Electroplaters' Society Week" in Boston.

ADULT REGISTRATION: For male and female adults—$25 per person, including Banquet, Outing, Boston Pops and all other AES official Convention events.

CHILDREN REGISTRATION: For registered children—$15 per child, not including Banquet or Boston Pops Concert but including three days of supervised sightseeing and children's program events, plus the Outing. Banquet tickets available at $8.50 per child extra. To the extent available, Boston Pops Concert tickets for registered older children, $1.50 per child extra.

HOTEL ACCOMMODATIONS: Order direct via Hotel Reservation Form already mailed to all AES members—with a copy, for convenience of stragglers, also included in this issue of PLATING MAGAZINE.

CONVENTION GENERAL CHAIRMAN: Louis V. Gagnon, P. O. Box 329, Framingham, Massachusetts.

LADIES CHAIRMAN: Mrs. George Parsons Swift, 40 Colonial Avenue, Waltham 54, Massachusetts.

GRAND OPENING SESSION • EDUCATIONAL PROGRAM • AES BOARD AND COMMITTEE MEETINGS • LADIES PROGRAM • CHILDREN'S PROGRAM • PLANT TOURS • DANCES • SIGHTSEEING • CLAMBAKE • BOSTON POPS CONCERT • SPONSORED RELAXATIONAL PROGRAMS • COCKTAIL PARTIES • GET-TOGETHER • GOLF TOURNAMENT • BANQUET • ENTERTAINMENT • FLOOR SHOW

YOUR PILGRIMAGE TO BOSTONTOWN

Aside from educational enrichment in the arts and sciences of electroplating, metal finishing and allied arts, always the stressed first purpose of every AES National Convention, and, of course, "off duty" hour Convention fellowship, relaxation and fun, the pilgrimage of YOU and YOURS to historic Boston will also enable YOU and YOURS to view, at close hand, many of the renowned shrines of American history.

As a single random example, one among a multitude of these shrines of our country in and near the Bay City is the farfamed Christ Church, popularly better known as Old North Church, from whose visible and majestic steeple, on April 18, 1775, Paul Revere displayed the signal lanterns that warned of the march of British troops to Lexington and Concord.

Oldest existing church edifice in the City of Boston, Christ Church took twenty years of the most careful Yankee craftsmanship to build—unmistakably like the London churches built by Sir Christopher Wren, but also unmistakably unique. The first peal of bells brought to America was installed in Christ Church steeple in 1745. Patriots and Loyalists worshipped there together before the Revolution, and its wine-glass pulpit, its box-pews, its brass chandeliers, its deeply recessed windows, its Avery-Bennett clock among so many other memorabilia still active, are vivid reminders in 1961 Boston of Old North's pre-Revolution majesty still durably present.

On the walls of the church are memorial tablets to some of the most famous American dead buried in its cellar tombs. And to the right of the chancel is a niche holding a bust of George Washington. In 1824, the Marquis de Lafayette, viewing that bust of his old friend said, "Yes, that is the man I knew, and more like him than any other portrait."

TENTATIVE PROGRAM

FORTY-EIGHTH ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.

STATLER-HILTON HOTEL, BOSTON, MASSACHUSETTS, JUNE 18-23, 1961

SUNDAY, JUNE 18

9:00 a. m.	Executive Board Meeting (All Day)	AES Headquarters Room
1:00–8:00 p. m.	Registration	Mezzanine
2:00 p. m.	Honorary Membership Award Committee Meeting	Room 418
2:00 p. m.	AES Scientific Achievement Award Committee Meeting	Room 410
3:00 p. m.	Ladies Program Tea of Welcome (Tentative)	Bay State Room
4:00 p. m.	Credentials Committee Meeting with Executive Board	Headquarters Room
8:00 p. m.	AES Get-Together Party	Grand Ballroom

MONDAY, JUNE 19

8:00 a. m.-9:00 p. m.	Registration	Mezzanine
9:30 a. m.	Children's Program (Tour of Salem-Marblehead Area, including Luncheon)	Buses from Statler Hotel
10:00 a. m.	Grand Opening Session	Grand Ballroom
11:00 a. m.	Business Meeting Supreme Society	Grand Ballroom
12:00 noon	Branch Secretaries' Luncheon	Parlor A
12:15 p. m.	Speakers' Luncheon	Parlor B
12:30 p. m.	Ladies Luncheon, *Sponsored by The Udylite Corporation*	Ballroom Assembly
1:00 p. m.	Plant Visit. Keystone Camera Co.	Buses from Statler Hotel
1:00 p. m.	Plant Visit. Boston Globe	Buses from Statler Hotel
2:00 p. m.	Opening Educational Session (The William Blum Lecture) "The Challenge Before Us" by Dr. Charles L. Faust	Grand Ballroom
2:30 p. m.	Editorial Board Meeting	Parlor C
2:30 p. m.	Educational Session A (Research)	Grand Ballroom
	1. Research Committee Chairman's Presentation	
	2. Research Project No. 14—"A Microscopic Study of Chromium Plating"	
	3. Research Project No. 15—"Progess Report on the Development of Corrosion Tests for the Performance of Plated Coatings"	
2:30 p. m.	Educational Session B (Organic Finishing)	Georgian Room
	4. "Functional Vinyls Go Decorative"	
	5. "Overcoming Organic Finishing Problems"	
	6. "New Epoxy Primer-Acrylic Lacquer Finish System"	
4:00 p. m.	Order of Past Presidents Meeting	Hancock Room
6:00 p. m.	Order of Past Presidents Dinner	Hancock Room
8:00 p. m.	MFSA Ball	Grand Ballroom

TUESDAY, JUNE 20

8:00 a. m.	Charles Henry Proctor Memorial Leadership Award Selection Committee Breakfast	Room 418
8:00 a. m.	Speakers' Breakfast	Parlor C
9:00 a. m.–5:30 p. m.	Registration	Mezzanine
9:00 a. m.	Educational Session C (Finishing of Light Metals Symposium)	Grand Ballroom
	7. "Nickel-Chromium Plating Upon Anodized Aluminum"	
	8. "Chemical Conversion Coatings for Aluminum Alloys"	
	9. "Outdoor Exposure of Anodic Coatings on Aluminum: Effect of Sealing"	
	10. "The Effect of Voltage During Anodizing of Aluminum"	
9:00 a. m.	Membership Committee Meeting	Room 436
9:00 a. m.	Public Relations Committee Meeting	Room 438
9:00 a. m.	Publications Committee Meeting	Room 437
9:00 a. m.	Educational Committee Meeting	Room 440
9:00 a. m.	Ladies Program (Scenic Tour of North Shore enroute to Ipswich)	Buses from Statler Hotel
9:00 a. m.	Plant Visit. Gillette Safety Razor Co. (1st group)	Buses from Statler Hotel
9:30 a. m.	Children's Program (Tour of Boston and Cambridge. Lunch at Smith House)	Buses from Statler Hotel
12:00 noon	Joint Educational Committee and Branch Librarians Luncheon	Parlor A
12:00 noon	Speakers' Luncheon	Parlor C
12:00 noon	Ladies Luncheon (Castle Hill, Crane Estate, Ipswich, Mass.) *Sponsored by M. E. Baker Company, The Lea Manufacturing Company and Lea-Ronal, Inc.*	Buses 9 a. m. from Statler Hotel
1:00 p. m.	Plant Visit. Gillette Safety Razor Co. (2nd group)	Buses from Statler Hotel

TUESDAY, JUNE 20 (continued)

2:00 p. m.	**Educational Session D (Finishing of Light Metals Symposium)**	Grand Ballroom
	11. "Plating on Magnesium by Electrodeposition and Chemical Reduction Methods"	
	12. "Anodizing or Conversion Coating of Magnesium"	
	13. "Chromic Acid Anodizing of Beryllium" (Part I)	
	14. "Chromic Acid Anodizing of Beryllium" (Part II)	
2:00 p. m.	**AES Midwest Regional Council Meeting**	434
2:00 p. m.	**Southwestern Regional Council Meeting**	436
2:00 p. m.	**Other Individual AES Regional Council Meetings (If Any)**	(To be Announced)
4:00 p. m.	**AES Regional Group and Council Chairmen's Meeting**	Room 442
4:30 p. m.	**Finishing of Light Metals Forum**	Grand Ballroom
8:30 p. m.	**"Fun with Fiedler" at Boston Pops**	Boston Symphony Hall

WEDNESDAY, JUNE 21

8:00 a. m.	**Research Committee Breakfast**	Parlor A
8:00 a. m.	**Speakers' Breakfast**	Parlor B
9:00 a. m.–12:00 noon	**Registration**	Mezzanine
9:00 a. m.	**Educational Session E**	Grand Ballroom
	15. "Quality Control Study to Determine Optimum Conditions for Barrel Plating in Zinc Cyanide Solutions"	
	16. "The Practical Application of Statistics to Quality Control of Electroplated Products"	
	17. (To be Announced)	
9:00 a. m.	**Educational Session F**	Georgian Room
	18. "The Anodic Behavior of Metals in Cleaning Media—Copper and Its Alloys"	
	19. "Production Nickel Plating on Molybdenum"	
	20. "Improved Adhesion of Electroless Nickel Plating on Titanium Alloys"	
9:00 a. m.	**Research Committee Meeting**	Parlor C
12:00 noon	**Speakers' Luncheon**	Parlor B
1:30 p. m.	**AES Annual Outing (Clambake at Historic Plymouth, Mass.)**	Buses from Statler Hotel

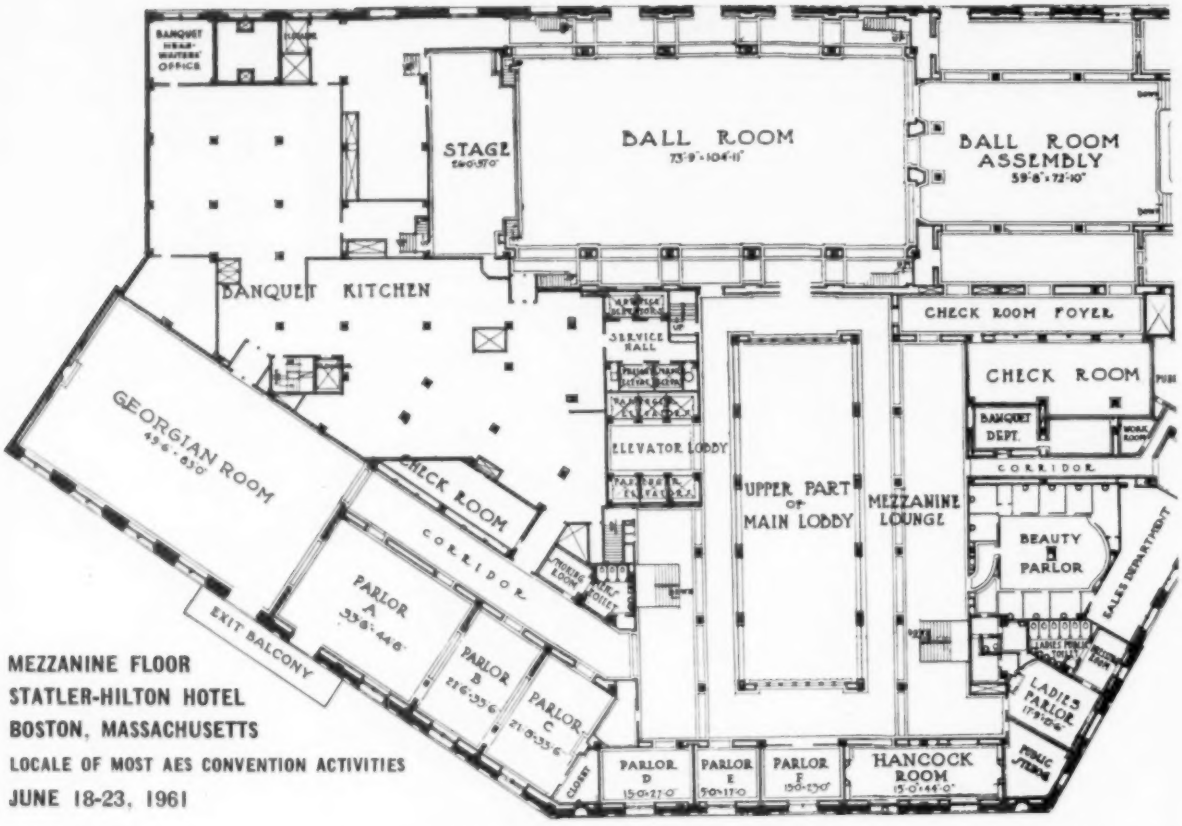
THURSDAY, JUNE 22

8:00 a. m.	**Speakers' Breakfast**	Hancock Room
9:00 a. m.	**Business Meeting, Supreme Society**	Parlors A, B, C
9:00 a. m.	**Educational Session G**	Grand Ballroom
	21. "Precious Metal Plating and Solderability"	
	22. (To be Announced)	
	23. "Stoichiometry of Copper Bonding Using Copper Oxide"	
9:00 a. m.	**Educational Session H**	Georgian Room
	24. "Corrosion Current Data for Nickel-Chromium Couples"	
	25. "Electroplating of Zinc-Base Die Castings in a System Incorporating Dual Chromium"	
	26. "Objectives in Corrosion Protection of Bright Decorative Trim and Their Implementation"	
9:00 a. m.	**Plant Visits. Western Electric Company, North Andover, luncheon at Western Electric plant, afternoon visit at Raytheon Mfg. Co., Andover**	Buses from Statler Hotel
9:30 a. m.	**Ladies Program: Tour of Historic Boston**	Buses from Statler Hotel
9:30 a. m.	**Children's Program (Boat ride on the Charles River. Also tour of Museum of Science and Planetarium)**	Buses from Statler Hotel
12:00 noon	**Speakers' Luncheon**	Hancock Room
12:30 p. m.	**Ladies Luncheon at John Hancock Building, *Sponsored by Sel-Rex Corporation*** **(Followed by talk "Gold and Man," illustrated by Oil Paintings)**	Dorothy Quincy Suite
2:00 p. m.	**Business Meeting, Supreme Society**	Parlors A, B, C
2:00 p. m.	**Educational Session I**	Grand Ballroom
	27. "Plating of Printed Circuits with Pyrophosphate Copper and Tin-Nickel"	
	28. "Evaluation of Solderability of Electroplated Coatings"	
	29. "Producing Ultra High Frequency Electronic Parts by Electroless Copper and Precious Metal Plating of Plastics"	
6:00 p. m.	**MFSA Cocktail Party**	Georgian Room
7:00 p. m.	**AES Farewell Banquet**	Grand Ballroom

FRIDAY, JUNE 23

8:00 a. m.	**President's Breakfast to National Officers and their Families**	Parlor C
9:00 a. m.	**Executive Board Meeting**	AES Headquarters Room

(This is a TENTATIVE PROGRAM as of March 1, 1961. Additions and modifications will be made monthly until finalized.)



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BOSTON, MASSACHUSETTS
LOCALE OF MOST AES CONVENTION ACTIVITIES
JUNE 18-23, 1961

HOTEL RESERVATION FORM
48th ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.
STATLER-HILTON HOTEL • BOSTON, MASS., JUNE 18-23, 1961

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EXECUTE AND MAIL PROMPTLY

Reservations will be held only until 6 p.m. on day of arrival unless later hour is specified. Reservation should be mailed promptly, and, in any case, must be received not later than two weeks prior to the opening date of Convention.

Room and Bath
For One— 10.00 □ 11.50 □ 12.50 □ 14.00 □
Per Day 10.50 □ 12.00 □ 13.50 □ 15.50 □

Double-Bed Room with Bath 16.00 □ 17.00 □ 18.50 □
For Two—Per Day 16.50 □ 18.00 □ 20.00 □

Twin-Bed Room with Bath 17.50 □ 19.00 □ 20.00 □
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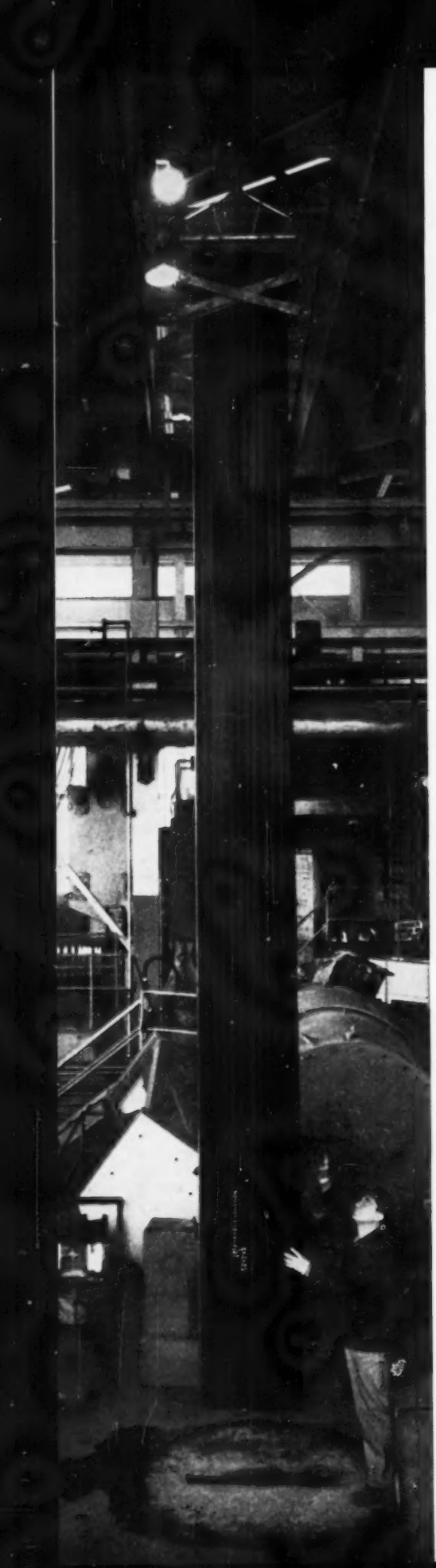
More Than Two Persons in One Room
For each additional person in Double or Twin-Bed Room, the extra charge is $4.00 per day.

SUITE—Living Room, Bed Room and Bath—Per Day
For One or Two Persons: 38.50 □ 40.00 □ 43.50 □ 39.00 □ 41.00 □

If a room at the rate requested is unavailable, one at the nearest available rate will be reserved.



ASARCO-MAX ANODES

How close can you get to perfection in copper anodes?

Here you see the closest thing to perfect copper now available for electroplating purposes. This is the huge, void-free, dense cake of copper from which Asarco-Max copper anodes are cut. The patented Asarco process gives a grain structure so uniform that an inspection of Asarco-Max anodes in the plating tank, one by one, makes you think you are looking at the same anode each time you pull one out. Corrosion of the anode is uniform from the solution level down to the end, and this reduces scrap loss and down-time for anode replacement. Asarco-Max copper anodes will be cut to provide the length and weight you prefer. For additional information about our low-cost anodes, write or call Federated Electro-Chemicals Department, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

ASARCO

INDICATE A 424.

INTERSOCIETY NEWS

LONDON SITE OF METALLIC CORROSION CONGRESS

The First International Congress on Metallic Corrosion is to be held at Imperial College, London from April 10 to 15, 1961. Eighty-four papers are to be presented by authors in many countries including England, USA, Finland, India, USSR, Hungary, Italy, No. Ireland, Belgium, Japan, Germany, Poland, Canada, France, South Africa, Holland, Rumania, Norway and Czechoslovakia.

The scientific program, comprising the 84 technical papers, is divided under 14 broad subjects: Inhibitors, Fundamental Studies, Cathodic and Electrolytic Protection, Metallic Coatings, Practical Experience, Corrosion in Atomic Energy, Boiler Corrosion, Intergranular and Stress Corrosion, Experimental Methods and Laboratory Corrosion Testing, Atmospheric Corrosion, High Temperature Oxidation, Corrosion Fatigue, Underground Corrosion, and Paints.

Membership is open to all interested persons. The address of the Congress is 14 Belgrave Square, London SW 1, England.

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NAMF ANNOUNCES CONVENTION PROGRAM

The National Association of Metal Finishers will hold its annual convention and management seminars at the Statler-Hilton Hotel, Boston, Mass., from Friday, June 16 to Monday, June 19, 1961. Highlight of the conclave will be the management seminars which, this year will feature a New England university professor, a magazine editor, and a leading equipment industrialist.

The first session will be held Friday morning and will include the traditional membership meeting and committee reports. The Rev. Dr. Harry B. Miner, Central Congregational Church, Newburyport, Mass., will deliver the invocation. An election of officers for the ensuing year and a directors' meeting will highlight the afternoon program. The ladies' program is kicked off with a style show in the Statler-Hilton Veranda Room.

Saturday's program features John S. Morgan, associate editor of *Steel* magazine and authority on taxation who will speak on "Depreciation Allowances and How They Affect the Metal Finisher." Mr. Morgan will be followed by Dr. Malcolm F. Severance, head of the department of commerce and economics, University of Vermont, who will talk on "Labor Relations: Perspective-Prospective." The final speaker will be William Mallory, northeast regional vice president of United States Leasing Corporation. His topic: "Pro's and Con's of Leasing Equipment." Speakers will place special emphasis on the relation of their topics to the job metal finishing industry, the announcement pointed out. According to seminar chairman William F. Acks (American Anodizing Corp., Quincy, Mass.), sessions are open to everyone, irrespective of NAMF affiliation.

Ladies and youngsters will take part in a historic tour of "Freedom Trail," highlighted by luncheon at the Wayside Inn, Sudbury, Mass. The Saturday program will be concluded with a reception and banquet at the Statler-Hilton Hotel. In addition to featured entertainment, the first industry "Man-of-the-Year Award" will be made along with other awards at the banquet.

Sunday's activities include an afternoon-long clambake-outing at Hotel Wentworth-by-the-Sea, at Portsmouth, N. H., and another tour of scenic places along the North Shore.

Convention committee chairmen: Honorary chairman, Robert L. Giesel, NAMF president, Adolph Plating, Inc., Chicago; general chairman, Napolean A. Vigeant, M & V Electroplating Corp., Newburyport, Mass.; ladies' program, Mrs. Napolean Vigeant, Newburyport, Mass.; seminars, William F. Acks, American Anodizing Corp., Quincy, Mass.; plant tour, Wendell Henry, Consolidated Metal, Inc., Cambridge, Mass.; transportation, William H. Harney, Tremont Old Colony Plating Co., So. Boston; outing, John R. Wright, F. M. Callahan & Son, Malden, Mass.; entertainment, Fred R. Davino, Plating for Electronics, Inc., Waltham, Mass.; hotel and banquet, Ernest D. Callahan, F. M. Callahan & Son, Malden, Mass.; and registration, Malcolm H. Plummer, Maine Metal Finishing Co., So. Gorham, Me.

Winding up the four-day convention will be a cruise to Provincetown and back for the ladies and youngsters. A tour of nearby metal finishing plants is scheduled for the men. Tour includes M&V Plating Co., Newburyport; F. M. Callahan & Son, Malden; Consolidated Metal, Inc., Cambridge; and Reliable Silver Plating Co., Somerville.

Host for the 1961 convention of job metal finishing industrialists is the Master Metal Finishers Association of New England, with offices in Boston. One of 17 affiliates of the National Association of Metal Finishers the New England association comprises leading job metal finishing firms in Maine, New Hampshire, and Massachusetts.

MASTERS' ELECTROPLATERS TO ASSEMBLE AT ANNUAL BANQUET MAY 27

On Saturday, May 27, 1961—in New York City's famed Plaza Hotel flanking Central Park and Fifth Avenue—the Masters' Electro-Plating Association (MEPA) will conduct its 43rd Annual Banquet and Entertainment.

Customarily one of the season's lavish and delightful electroplating social functions, this year's edition being arranged by Banquet Chairman Walter Turner and Vice Chairman L. A. Kornblum is being planned to meet MEPA's usual high standards.

The Banquet itself will be preceded by a reception and cocktails starting at 6:30 p.m. Dress will be optional. Tickets are priced at $25 per person and are available from MEPA's offices at 59 East 4th Street, New York City. A. T. Marinaro is the Association's Executive Director.

Composed of the bulk of major electroplating companies in the New York Metropolitan area, MEPA is headed this year by Charles R. Leva as Chairman who last year was voted "Plating Man of the Year." His successor "Plating Man of the Year" will be announced at the May 27 Banquet.

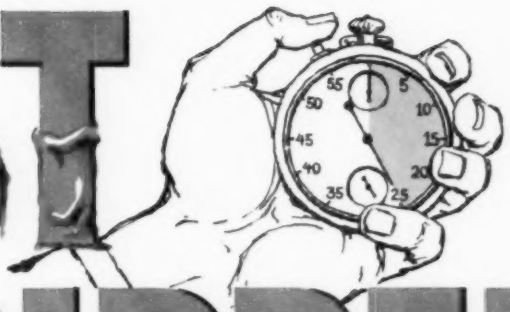
ENGINEERS SPONSOR HEAT TRANSFER CONFERENCE

A five-day International Heat Transfer Conference, August 28 to September 1, 1961, at Boulder, Colorado, will be sponsored by four engineering societies, two American and two British, with participation by eight others, will be held on the campus of the University of Colorado. Papers will be presented by engineers from the United States, Canada, England, USSR, Japan, Poland, Australia, France, Switzerland, Scotland, Sweden, Germany and Yugoslavia.

Over one hundred papers on recent original work and new applications in heat transfer theory and practice will be reviewed by reporters and discussion of the papers will be emphasized. In addition, four lectures will review and synthesize recent developments in research and application. According to Dr. S. P. Kezios, secretary of the Committee on North American Participation, discussion at the Boulder Conference will be continued at a special meeting in London, England in 1962 under the auspices of the Institution of Mechanical Engineers.

INDICATE A 425. ➤

FAST STRIPPERS



✓ **FAST, CLEAN WORKING**...unlike caustics or strong acids, these strippers do not dissolve or decompose enamel or lacquer. These strippers break the bond between the metal and the organic coating. Loosened coating then slips off in sheets or shreds.

✓ **NON-CORRODING**...our strippers do not attack aluminum, zinc, ferrous metals or any other metal or alloy.

✓ **CONVENIENT**...stripped metal may be rinsed with water, dried and refinished immediately.

LEA COLDSTRIP

1. Requires no dilution. Use full strength.
2. No heating required. Use at room temperature.
3. Although toxicity is low, care should be taken to avoid contact with the skin.
4. Minimum ventilation required.
5. Can be strained for continued use.
6. Surface of Coldstrip is self-sealing (reduces evaporation).

LEA SYNSTRIP

1. May or may not be diluted with water, depending upon the film adherence.

Maximum dilution should be 1 part Synstrip to 6 parts water.

2. Can be used cold or heated. Heating to temperature from 160° to 200°F. cuts stripping time.
3. Toxic. Avoid inhaling or contact with skin.
4. Heated solution requires ventilation to remove fumes.
5. Can be strained for continued use.
6. Evaporated water should be replaced to maintain concentration. Baumé readings on a hydrometer will determine the amount of water to add.

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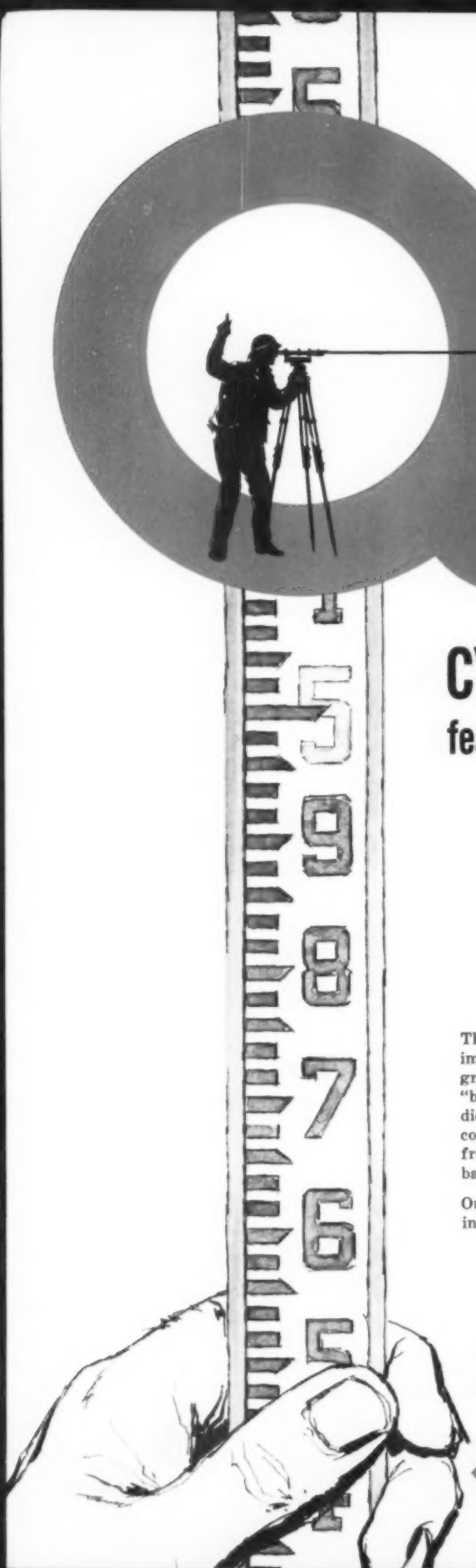
STRIPPERS



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CYANIDE COPPER PROCESS

featured by these highlights:—

- **Simplicity of Operation—only one brightener used to produce lustrous deposits**
- **Exceptional Hiding and Micro-Leveling Qualities**
- **High Tolerance to Organic and Metallic Contaminators, including zinc**
- **Lustrous copper deposits secured at high rates of deposition. Readily nickel plated**
- **More Die Castings are Plated in Q-Level than any other Copper Bath**

The Q-Level Process is applicable where maximum hiding of surface imperfections is demanded and full brightness not required. Improved grain structure enhances subsequent bright nickel deposits even over "burned" copper area . . . Q-Level will hide most 'cold shots' in zinc base die castings; surface roughness of 10 RMS or below tend to be leveled . . copper plate from Q-Level is easily buffable, much more so than deposits from conventional cyanide baths. . . . Air or mechanical type agitated baths with direct, current interruption or periodic reverse available.

Our technical staff will show you how to get maximum results by changing over your present cyanide process to Q-Level.

*Patented and Patents Pending

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COLLEGES SHARE IN ASM ENGINEERING SCHOLARSHIPS

College scholarships totaling $30,500 will be presented this year by American Society for Metals' Foundation for Education and Research.

Equal awards of $500 will be given to metallurgical students at 61 participating colleges and universities throughout the United States and Canada. Winners are chosen by the schools themselves, and receive a certificate in addition to the cash award.

The ASM Foundation for Education and Research was established in 1953 to recognize outstanding achievement in the study of metallurgical engineering, and to encourage more students to enter this important profession. The $750,000 Foundation is the largest ever established by a technical society from its own resources.

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ELECTROPLATING DEFINITIONS TO BE PUBLISHED

ASTM Committee B-8 on Electrodeposited Metallic Coatings and Related Finishes has prepared for publication a series of over 200 definitions relating to electroplating of metals. These are the first definitions that have been prepared by the committee covering terms used in ASTM standards and in the industry.

A specification for multi-layer (duplex) electrodeposited nickel coatings has been prepared to permit standardization of these coatings for use in outdoor surfaces. Two systems are being considered for designating chromium-nickel-copper decorative coatings that will permit labeling to ensure consumer quality. One of these methods will be presented to the Society for publication at the earliest possible time.

Interlaboratory work is continuing to find the best dye for checking the sealing of anodic coatings on aluminum alloys. A specification for anodic film thickness has been completed.

Interlaboratory data on the use of magnetic flux gages to measure electrodeposited film have been reported. These data will provide a basis for revising and enlarging existing thickness test methods in the near future.

The committee will sponsor a symposium on electroforming in the near future. Those interested in participating in this symposium are urged to get in touch with Edward B. Saubestre, technical director, Enthone, Inc., Box 1900, New Haven 8, Connecticut.

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RESEARCH AND DEVELOPMENT SUBJECT OF DESIGN SHOW

A substantially enlarged conference program and the largest exhibit ever held in the field will feature the 1961 Design Engineering Show and Conference. Both events will take place at the new Cobo Hall, Detroit, May 22 through 25.

Devoted entirely to research and development of new products, the twin events will present the latest developments in the materials and components which go into products, as well as design techniques which reduce production costs.

More than 400 companies will participate in the exposition. The machine design division of the American Society of Mechanical Engineers sponsors the conference. All available space in Cobo Hall will be used for exhibit booths.

Because the show is being held in Detroit for the first time, the opening conference session will be entirely devoted to design engineering in the automotive field. Officials of Ford, Chrysler, General Motors and American Motors will participate in the opening session on "Designing for Today's Competitive Market."

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PROGRAM ANNOUNCED FOR GORDON RESEARCH CONFERENCE ON ELECTRODEPOSITION

The 1961 Gordon Research Conference on Electrodeposition will be held at Tilton School, Tilton, New Hampshire from July 31 to August 4, 1961. The co-chairmen for the conference are Dr. Walter R. Meyer and Dr. Martin S. Frant.

The Gordon Research Conferences were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and discussion groups. Sufficient time is available to stimulate informal discussions. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading or participation in discussion groups as the individual desires. This type of meeting is a valuable means of disseminating information and ideas to an extent that could not be achieved through the usual channels of publication and presentation at scientific meetings.

The purpose of the program is to bring experts up to date on the latest developments, to analyze the significance of these developments and to provoke suggestions concerning the underlying theories and profitable methods of approach for making progress. The review of known information is not desired.

In order to protect individual rights and to promote discussion, it is an established requirement of each conference that no information presented is to be used without specific authorization of the individual making the contribution, whether in formal presentation or in discussion. Scientific publications are not prepared as emanating from the conferences.

Attendance at the conference is by application. Individuals interested are requested to send their applications to the Director at least two months prior to the date of the Conference. All applications must be submitted in duplicate on the standard application form which may be obtained by writing to the office of the Director. Attendance at the conference is limited to approximately 100 conferees.

Requests for attendance, or for additional information, should be addressed to W. George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, Rhode Island. After June 12 mail for the office of the director should be addressed to Colby Junior College, New London, New Hampshire.

GORDON RESEARCH CONFERENCE ON ELECTRODEPOSITION
JULY 31–AUGUST 4, 1961
TILTON, NEW HAMPSHIRE

W. R. Meyer and M. S. Frant, Conference Co-Chairmen

MONDAY, A. M.

The Mechanism of Electrodeposition—W. R. Meyer, Chairman

"Nature and Kinetics of Discharge Species at the Electrode Surface"—N. B. Hackerman, University of Texas.

"Metal Deposition: Double Layer Effects and Investigation of Fast Discharge Processes"—P. Delahay and D. Mohilner, Louisiana State University.

MONDAY, P. M.

The Mechanism of Electrodeposition (Continued)—E. B. Saubestre, Chairman

"Rate-determining Steps and Paths in the Electrodeposition and Electrodissolution of Thin Metallic Layers"—J. O'M. Bockris, University of Pennsylvania.

"Transient Phenomena at the Iron-Solution Interface, and the Mechanism of the Deposition and Dissolution of Iron"—J. O'M. Bockris, D. Drazic and H. Kitz, University of Pennsylvania.

TUESDAY, A. M.

The Mechanism of Electrodeposition (Continued)—N. Hackerman, Chairman

"Electrochemical Adsorption of Heterocyclic Bases and Ionic Derivatives"—R. G. Barradas and B. E. Conway, University of Ottawa.

Late papers and general discussion on mechanisms.

TUESDAY, P. M.

Addition Agents in Electrodeposition—O. Kardos, Chairman

"The Role and Structure of Addition Agents in Electroplating, with Special Reference to Nickel"—H. Brown, Udylite.

"Some Aspects of Brightener Action"—D. Trivich, Wayne State University.

"Leveling in Bright Nickel Deposits"—S. E. Beacom, General Motors Corporation.

WEDNESDAY, A. M.

The Effect of Structure on Properties. A) Basis Metal Structure—A. Brenner, Chairman

"Effect of Substrate Metallurgy"—M. H. Jones, Ontario Research Foundation.

"Nickelplating on Copper Single Crystals"—H. Leidheiser, Virginia Research Institute.

"A New Field: Surface Metallurgy"—L. D. McGraw, Battelle Memorial Institute.

WEDNESDAY, P. M.

The Effect of Structure on Properties. B) Coating Metal Structure—A. Brenner, Chairman

"Plastic Properties of Electrodeposits"—H. J. Read, Pennsylvania State University.

"Stress in Electrodeposits"—A. M. Max, R. C. A.

THURSDAY, A. M.

Electrodeposition of Alloys—F. A. Lowenheim, Chairman

"Electrodeposition of Alloys of Some of the Transition Metals"—M. L. Holt, University of Wisconsin.

"Current Research on Electrodeposited Thin Magnetic Films. A Critical Survey"—H. Koretzky, IBM Research.

"Factors Affecting Magnetic Properties of Iron-Nickel Films"—I. Wolf, General Electric Company.

THURSDAY, P. M.

Electrodeposition on Unusual Substrates—H. B. Linford, Chairman

"Metal Deposition on Semiconductors"—D. R. Turner, Bell Telephone Laboratories.

"Plating on Unusual Metals"—E. B. Saubestre, Enthone, Inc.

FRIDAY, A. M.

Current Problems in the Utilization of Plated Coatings—N. Murphy, Chairman

"Electrodeposited Metals as Electrical Contacts"—M. Frant, AMP Inc.

"Solderability of Plated Metals"—F. A. Lowenheim, Metal and Thermit Corporation.

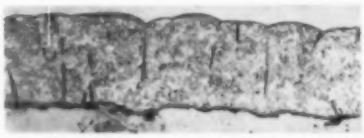
"Electrodeposited Coatings for High Temperature Applications"—C. Levy, Gillette Safety Razor Company.

◀ INDICATE A 426.

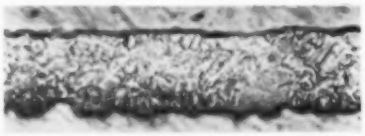
Call Du Pont: for better top-quality chemicals . . . timesaving

Now . . . you can deposit a level coat of copper on metal parts

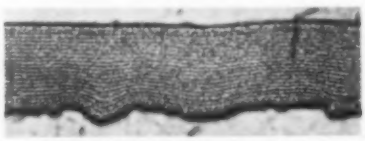
New process lowers finishing costs . . . improves appearance . . . provides an excellent undercoating for nickel and chromium.



1. Photomicrograph shows 0.001-inch copper plating on polished steel of 24 RMS. Conventional copper plating (above) shows uneven surface using direct current.



2. Du Pont's level-coating process with *interrupted current* shows amorphous structure and relatively level surface . . . satisfactory where maximum leveling is not required.

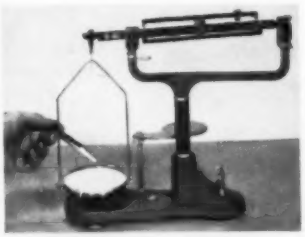


3. Same process with current reversal gives laminar structure, extremely level surface. *Current reversal* is employed where maximum leveling of surface is desired.

A combination of chemical additives and current variations form the basis of this new leveled copper plating method. Included are a high-efficiency cyanide copper bath and special Du Pont addition agents: Elchem 1396 and 1442M. The process can be easily and inexpensively adapted to most plating operations.

You'll avoid trouble and save time with new Du Pont double salts—

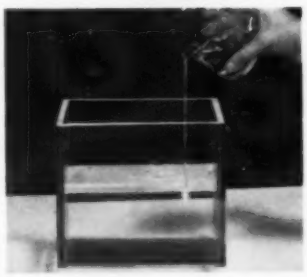
Sodium-Copper Cyanide and Potassium-Copper Cyanide



NEW DIRECT METHOD

1. You weigh required amount of Du Pont double salt instead of potassium or sodium cyanide *and* copper cyanide.

2. You dissolve double salt in water or plating solution. You eliminate steps of dissolving separate chemicals.



3. You add double salt directly to plating tank with no filtering necessary. Active ingredients are in proportions usually required. You save time, reduce handling, avoid waste and mixing errors.

The balanced composition of Du Pont double salts simplifies calculations required in making up new baths or replenishments. (1 oz. potassium-copper cyanide double salt equals 0.26 oz. copper, or 0.37 oz. copper cyanide; 1 oz. sodium-copper cyanide double salt equals 0.29 oz. copper or 0.41 oz. copper cyanide.) Both Du Pont double salts are packed in handy, moisture-resistant 100-lb. net fiber containers.

DISTRICT OFFICES

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Charlotte 1, N. C. . . . . 427 W. Fourth St.
Chicago 40, Ill. . . . . 7250 N. Cicero Ave., Lincolnwood
Cincinnati 2, Ohio . . . . . 2412 Carew Tower
Cleveland 20, Ohio . . . . . 11900 Shaker Blvd.
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Export Division . . . Du Pont Building . . . Wilmington 98, Delaware

electroplating at your plant... methods... dependable service

Two convenient forms of sodium cyanide 97%

ALL-PURPOSE CYANOBRIK®

—handy, pillow-shaped briquettes of 97% minimum sodium cyanide for all applications: plating, case hardening and chemical manufacture. Cuts inventory and purchasing problems. Made by a new Du Pont process, the briquettes are lower in moisture content and are more moisture-resistant than before.

CYANOGRAN® M

—granular, easily dissolved form of 97% minimum sodium cyanide. Ideal for dry compounding where uniformity of size is desired. "Cyanogran" M will pass through a 10 mesh screen; is retained on a 50 mesh screen. Absence of fines and dusting makes it easy to handle. It sells at the same low price as All-Purpose "Cyanobrik".

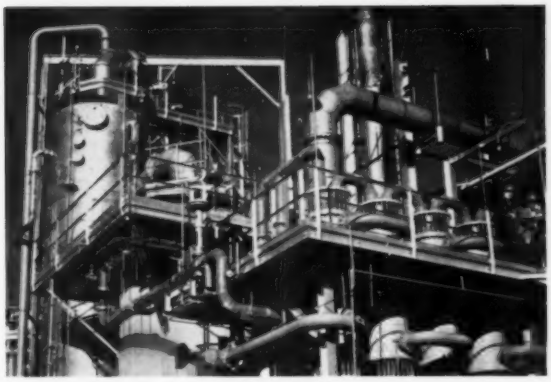
Du Pont sodium cyanides are highly suitable for cyanide electroplating solutions, including copper, brass, zinc and cadmium normally using sodium cyanide. Negligible sulfide content makes them especially attractive for use in sulfide-sensitive, bright copper baths. Specifications:

(NaCN-97% min.; NaCl-0.2% max.; Sulfides as S-0.0005% max.)

POTASSIUM CYANIDE

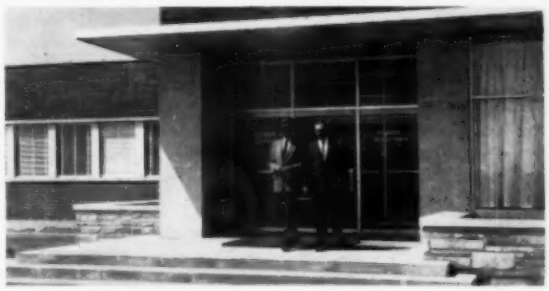
The extremely low sulfide content and high assay of Du Pont potassium cyanide make it ideal for all plating solutions in which potassium cyanide is specified. It is particularly suitable for use in modern bright cyanide copper, gold and silver plating baths. Specifications:

(KCN-98% min.; KCl-0.5% max.; Sulfides as S-0.0003% max.)



New modern plant assures reliable domestic source of supply

Centrally located in Memphis, Tenn., Du Pont's new chemical plant (above) is producing the high-quality sodium and potassium cyanides mentioned at left. This new source of supply means that you can depend on Du Pont to meet your needs quickly . . . at all times.



Technical service for you

Du Pont's nationwide staff of technical field men is ready to assist you whenever you ask for help. They're backed by a 2-million-dollar Sales Technical Laboratory in Wilmington, Delaware. All lab facilities are at your disposal. For more information on Du Pont electroplating chemicals and timesaving processes, call your nearest Du Pont representative (see below).

E. I. DU PONT DE NEMOURS & CO. (INC.)
ELECTROCHEMICALS DEPT.,
SODIUM PRODUCTS DIVISION
WILMINGTON 98, DELAWARE

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

INDUSTRY NEWS

MICHIGAN PLATING COMPLETING EXPANSION

Michigan Plating & Stamping Company, a supplier of automobile and truck bumpers, is nearing the end of a five-year, $1.5-million expansion program which has been calculated to double the company's production, it is announced by John H. DeVries, executive vice president of the firm.

Mr. DeVries said the expansion program included the installation of several large bumper presses, additional nickel tanks which will increase the plant's plating capacity, a streamlining of plant layout, and the addition of 3800 square feet to the shipping area.

♦

DIFFERENCES IN CORROSION RESISTANCE OF VARIOUS POLYESTER TYPES

A report on the physical properties of various types of polyesters after immersion in corrosive solutions for a one year period, released recently by Atlas Powder Co., Wilmington, Del., at the 16th Annual Conference of the Reinforced Plastics Division, Society of the Plastics Industry, in Chicago, shows that the ability of a polyester to withstand corrosion depends upon the specific chemical structure of the plastic. According to S. S. Feuer, development supervisor, Chemicals Division, the wide differences in the performance of these materials makes it vital for designers and fabricators of corrosion resistant equipment in the chemical processing, metal treating, and other fields to go through a careful evaluation before specifying a particular plastic for an application.

LEA WILL EXHIBIT AT LONDON FINISHES EXHIBITION

Lea Manufacturing Company of England, Ltd., a subsidiary of the Lea Manufacturing Co. of Canada Ltd., whose parent company is the Lea Manufacturing Co. of Waterbury, Conn., will be exhibiting at the First International Industrial Finishes Exhibition to be held in London between May 8 and 11, 1961. Lea's exhibit will feature their full line of industrial abrasive compositions and electrochemical processes including Lea-Ronal's gold plating solutions. Lea will occupy Booth No. 137 and Dr. H. L. Kellner, vice president of Lea—Waterbury, in addition to Frank Anderson, managing director of Lea—England, will welcome all overseas visitors.

♦

CHEMICAL CORPORATION IN INTERNATIONAL AGREEMENT

Under mutual licensing agreements recently concluded between the Chemical Corporation of Springfield, Massachusetts and Tool Treatments (chemicals) Ltd. of West Bromwich, England, each company is now manufacturing and marketing the other's metal finishing trade products for home consumption.

The Luster-On line of chromate conversion coatings for corrosion protection and decorative finish of non-ferrous surfaces will be represented throughout Great Britain and Ireland by Tool Treatments. In exchange, the Chemical Corporation will offer the Blakodizing Chemical Blackening Process for steel for the first time in the United States. It is widely accepted throughout Britain and meets specifications for the British Defense Ministry.

Basic arrangements for the licenses were concluded between Bryant H. Gardner, executive vice president of the Chemical Corporation and Dennis A. G. Colling, managing director of Tool Treatments Ltd., during Mr. Gardner's recent trip to England and the Continent. Subsequently Harold L. Mitchell, Chemical's vice president of metal finishing and technical director, spent a week in England exchanging formulas and data on production processes. The following week he conducted a sales seminar for the Luster-On licensee for Scandinavia, Harbeck Division of A. B. Tudor of Stockholm and Gothenburg as well as visiting user Plants in Sweden and Denmark.

♦

THREE TRAINING COURSES OFFERED BY WEINER

Three 12-week courses on phases of electroplating and metal finishing are being conducted by Milton Weiner at his laboratory located at 12631 Imperial Highway, Sante Fe Springs, California.

Program A—Electroplating and Metal Finishing, includes safety, handling of chemicals, preparation of metals, solution purification, corrosion, conversion coatings, finishing of metals, specifications, ultrasonics and many other subjects, plus plant tours. Program B covers chemistry and electrochemistry, and Program C is designed to give the plater and metal finisher knowledge of costs and how to calculate prices.

♦

TEN STEEL TANK CARS FABRICATED WITH BART PRODUCT

Based upon five years of successful performance in the handling of liquid chemical cargoes with a steel tank car fabricated from Bart Lectro-Clad Nickel, the Union Tank Car Company recently completed its order for ten additional tank cars which were made of the same type of steel plated with nickel by the Bart Manufacturing Corporation of Newark, N. J.

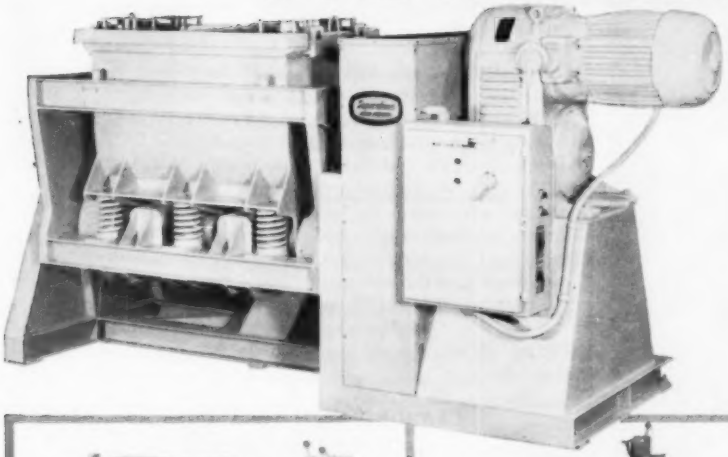
Because of its ability to withstand any forming or fabricating operation that steel itself will withstand, Bart Lectro-Clad nickel plated steel was specified for the new tank cars. By plating a ductile, adherent nickel coating 0.008-inch thick on drawing quality steel, Bart was able to furnish Union with a material that could be fabricated into a completely nickel-lined tank car.

Partial view of the production area in the new, specially designed Platronics building in Linden, New Jersey. Reportedly the largest electroplating facility in the country for processing electrical/electronic components.

UP TO 100 TIMES FASTER FINISHING WITH

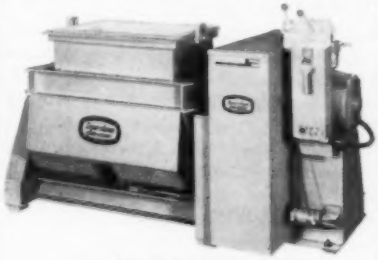
ALMCO

VIBRASHEEN



ALMCO'S FULL LINE OF NEW VIBRASHEEN MACHINES

MODELS VT-717 — 712
(18 and 12 cu. ft. capacities)
Ideal for large components requiring fixtures or a large volume of smaller parts.

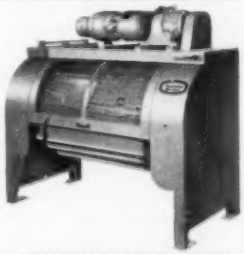


MODELS VT-77 — 75
(7 and 5 cu. ft. capacities)
Efficiently deburrs and finishes parts in quantities suitable for medium size production runs.

MODELS VT-72 — 71
(2½ and 1 cu. ft. capacities)
Popular unit for firms requiring precise finishing of a wide variety of parts in small lots.

MODEL VT-70
(¾ cu. ft. capacity)
Bench model ideally suited for miniature bearings, extremely small gears, stampings, etc.

WORLD'S LARGEST LINE OF PRECISION FINISHING EQUIPMENT



ADVANCED DESIGN SERIES
Thirteen models are available in this series featuring capacities of from 5 to 40 cu. ft., each equipped with variable speed drives. (Infinite from 6 to 30 rpm's.)

SPINDLE MACHINES
Designed for fast precision finishing of complex, high quality components such as gears, bearing cages, spline shafts, rotors, on continuous production "in line" basis.

CUSTOM DESIGN BARRELS
Special large diameter barrels are available to accommodate extra large parts. Fixtures hold parts to assure complete, precise finishing of all crevices and surfaces.

SEND FOR NEW ALMCO CATALOGS ON BARREL FINISHING MACHINES MEDIA, AND COMPOUNDS

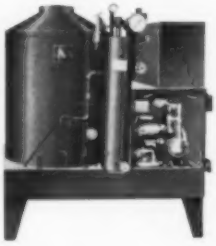
ALMCO
Supersheen

Queen Products Division Of King-Seeley Thermos Co.
304 E. Main Street • Albert Lea, Minn.

MALSBARY STEAM

heats 40° F. higher, 2 hours faster; cuts fuel costs 20-30%

After switching from open-flame gas burners to a Malsbary 15 bhp steam generator to heat its 10 tanks (2000 gals.), Houston Electro-Plating Co. reports: "Malsbary flash-type coil produces steam at about 300° F. and 10 psig within 2-3 minutes... wastes no fuel keeping tanks hot overnight. We heat solutions to 40° F. higher, two hours faster, at 20-30% less fuel cost. It's also considerably cleaner, more comfortable, especially in summer, and safer—keeps our insurance premiums down."



Easy to Install and Care For. Houston Electro-Plating made their own installation—so can you. The 15 bhp model shown is a space saver, too, requiring only 30" x 48" floor area. Coil-type construction does away with costly re-tubing, and shutdowns for official inspection.

From **$740.00** return system included

Low initial cost. 5, 10, 15, 30 bhp sizes. For further details mail coupon now.

MALSBARY STEAM GENERATORS SINCE 1921

Malsbary Manufacturing Co., 845 - 92nd Ave., Oakland 3, Cal.

SG-9

Malsbary Manufacturing Co.
845 - 92nd Ave., Oakland 3, Calif.

Please send details on Malsbary steam for plating shops.
I am ☐ plater; ☐ dealer; ☐ mf's rep.

Name_____ Title_____

Company_____

Address_____

INDUSTRY NEWS BRIEFS

TRANSISTOR GOLD PLATING MOTION PICTURE PRODUCED BY SEL-REX

A 16mm technicolor motion picture produced by Sel-Rex Corporation, Nutley, N. J., is concerned with an important step in the manufacture of transistors and other semiconductor products—gold electroplating to improve function and reliability.

Essentially a case history presentation, the motion picture visits the new plant of Platronics, Inc., Linden, N. J. While the picture follows the mechanical and electrochemical procedures involved in processing transistors, the narration fills in technical details regarding materials and equipment being used.

The film, which runs approximately eight minutes, supplies detailed information on "pilot plant" trial runs, prior to production plating; special equipment required for optimum results and lowest reject rates; preplate calculations to assure consistent quality; and quality-control procedures initiated in the trial run, followed through to laboratory tests after plating.

A print of "Case History: Gold Plating Transistor Headers at Platronics" is available free of charge for showing at technical meetings.

♦

CARBORUNDUM TO BUILD NEW AUSTRALIAN PLANT

The Carborundum Company will construct a million dollar coated abrasive manufacturing plant in Melbourne, Australia.

The new plant, to be equipped with advanced facilities in the coated abrasive industry, is designed to meet the growing demand for coated abrasives in Australia and New Zealand.

Carborundum Australasia Pty. Ltd., a Carborundum subsidiary, now operates a plant in Sydney, Australia. Its manufacturing operations will be transferred to the new Melbourne plant when it is completed in late 1961.

♦

METALS DEPARTMENT FORMED BY DOW

Formation of a new metals department in The Dow Chemical Company has been announced.

W. J. Rave, manager of magnesium production in Dow's Texas Division, has been named manager of the new department. Hilary A. Humble has been appointed sales manager, Metals Department.

♦

RIEGEL NAMES CROWN CHEMICAL WEST COAST DISTRIBUTOR

The Crown Chemical and Engineering Company, with offices at 4722 Worth Street, Los Angeles and 2160 Palou Avenue, San Francisco, has been appointed exclusive West Coast distributor for the Bias Buff Division of Riegel Textile Corporation. Riegel announced that Crown will carry adequate inventory for West Coast industrial needs, including bias, finger, sisal, gem and fire retardant buffs, and polishing wheels. Crown also will be fully equipped to analyze buff problems.

♦

VINELAND CIRCUITS OCCUPY NEW PLANT

Vineland Circuits, Inc. recently opened its new facility which will produce precision plated circuits. The 5000-square foot plant is located at 10655 Chandler Boulevard, North Hollywood, California.

Helen Lewis, general manager, announces that the newest equipment for producing reliable printed circuit boards has been installed in the facility.

Miss Lewis states that all plating will be processed by the affiliate company, Vineland Plating Company, and will be under the direction of Henry Saklad. These plating facilities are exclusively designed for processing printed circuit boards, and include nickel, solderplate, gold and rhodium plating equipment.

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
SEL-REX CORPORATION
Nutley, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

2,914,837, 12/1/60—SELENIUM RECTIFIER CELL—H. Schweickert and A. Herlet, assignors to Siemans Schuckertwerke.

Claim 1 reads: "In the manufacture of selenium rectifier cells, the process of depositing, over a period, a layer of amorphous selenium on a base electrode, applying crystallite growth-velocity modifier substance to the selenium during the period within which the amorphous selenium is being deposited, the selenium deposition and the application of the modifier substance being carried out by vaporizing them and passing the vapors over the base electrode, the modifier substance being vaporized under vacuum, the partial pressure of the vapor of the modifier being not higher than about 10^{-2} mm. Hg, controlling the subsequently produced rate of growth of the crystallites across the depth of the layer to obtain a higher rate in the region adjacent the base electrode than in the portion of the layer more remote from the base electrode, the said control being obtained by changing the proportion of the modifier substance with respect to the selenium being deposited during said deposition period and as the deposited layer of selenium increases in depth, thereafter crystallizing the amorphous layer of selenium by heating, and applying a counter electrode at the face of the rectifier opposite the base, to form the cell."

9 claims.

♦

2,915,414, 12/1/60—COPPER COATING PROCESS—H. Hitemn, Mount Vernon, N. Y.

Immerse activated iron particles in an alkaline glycerine-alcohol-water solution and apply to a surface at the same time as applying a copper sulfate solution to the surface.

5 claims.

♦

2,915,417, 12/1/60—COATING URANIUM AND THORIUM—R. Potvin, et al., assignors to Atomic Energy of Canada, Ottawa, Canada.

Immerse the clean uranium or thorium in a 0.1 to 11.5 per cent As_2O_3 solution to provide a protective coating.

2 claims.

♦

2,915,440, 12/1/60—MANGANESE COMPOUNDS—T. Pearson, assignor to Ethyl Corp., New York, N. Y.

An electrolytic method for producing cyclopentadienyl manganese compounds is described.

6 claims.

♦

2,915,441, 12/1/60—PREPARATION OF METALS—E. Pruvot, assignor to Pechiney, Paris, France.

A metal halide molten bath for the preparation of Al, Be, Ti and Zr is given. See also 2,915,442 and with 23 claims and figure and 2,915,443 with 7 claims for aluminum.

8 claims.

more users every day... are finding STANDARD RESEARCH metal cleaning and finishing products SAVE TIME and MONEY!

Industrial Cleaners • Paint Strippers
Protective Finishes • Phosphate Coatings •
Aluminum Finishes and Fluxes • Silver Brazing
Fluxes • Black Oxide Processes •
Soluble Oil Clarifiers

Whatever the job, whatever the metal, you will find a Standard Research product or process that will meet your needs exactly—save you Time and Money. Write for free bulletins.

new! Estox 62 Electro Cleaner

This new, improved formulation rapidly and efficiently electro-cleans non-ferrous metals. Is especially applicable for cleaning zinc base die castings. Has controlled alkalinity and colloidal inhibitors in suspension. Free rinsing, non-foaming, Estox 62 has long life and is very economical to use. For full details on Estox 62 and other Estox Electro-Cleaners, ask for Bulletin 500.

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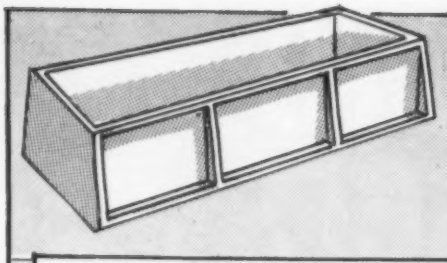

BUILT TO LAST LONGER

Jalco Fiberglass Tanks are sturdily built; chemical resistant. Choose from many stock sizes to 25 feet long. Send for FREE catalog.

JALCO TANK CO. P.O. Box 11014 Phoenix 17, Ariz.

USE READER SERVICE CARD; INDICATE A 431.

A fast inexpensive way to clean your plating racks

SIMPLE, AIR OPERATED TOOL
Adjustable . prevents rack injury

INGERSOLL RAND

Does not hammer until anvil touches the metal .. then strips the metal in seconds.

$60.00

U.S. INDUSTRIAL TOOL & SUPPLY CO.
8958 GREENFIELD • DETROIT 28, MICH. • BR 3-8318

USE READER SERVICE CARD; INDICATE A 432.

2,915,444, 12/1/60—CLEANING AND PLATING FERROUS METALS—Walter R. Meyer, assignor to Enthone, Inc., New Haven, Conn.

To remove oxides of iron and other foreign matter from ferrous metals subject said metals to cathodic electrolysis in an aqueous solution of *p*H above 10.0 containing gluconate, saccharrate, EDTA and a number of similar complexing agents.

19 claims.

♦

2,962,811, 12/6/60—BRAZING STAINLESS STEEL—T. Herbert, assignor to Rohr Aircraft Corp., Chula Vista, Calif.

To braze a stainless steel sheet to a stainless steel core of the honeycomb type, deposit the electroless nickel thereon then press and heat the components at 1700 to 1850F.

2 claims, figure.

2,963,383, 12/6/60—SILVERING—A. Weinrich, assignor to Kay Chemicals, Inc., Dallas, Texas.

Claim 1 reads: "A process of spray silvering which comprises continuously flowing a stream of concentrated reducible silver salt solution, continuously flowing a stream of concentrated reducing solution at substantially the same rate as said stream of silver salt solution, continuously flowing a stream of carrier and diluent water in a volume of from 10 to 100 times the volume of said silver salt solution, co-mingling all three streams to produce a mixed stream containing water, reducible silver salt solution and reducing solution in a state of reactivity such as to deposit silver in a uniform dense layer upon the spraying of said mixed stream onto a support, and spraying said mixed stream onto said support."

5 claims.

COMMERCIALLY PURE TITANIUM

For use in ANODIZING, PLATING & OTHER APPLICATIONS

SHEET
6" to 36" wide by 24" to 72" long
Cut to clip size at no extra cost
Available in gages:
.016—.020—.028—.032—.040
.045—.050—.060—.070—.080
.090—.125—.160—.170

PLATE
Cut to size at no extra cost
¼"—½"—⅝" thickness

COMPLETE INVENTORIES
•
IMMEDIATE DELIVERY
•
SUBSTANTIALLY BELOW MILL PRICES

WIRE
Mill lengths in
1/32"—⅛"—¼" diameter

FASTENERS
Nuts, bolts, studs, washers and other fasteners in all sizes and gages for immediate shipment

ROD
Mill lengths in
⅜" and ½" round or square

BAR
¼" x 1" stock in
12" to 84" lengths

FRANKEL COMPANY, INC.
TICO DIVISION
19300 Filer Avenue
Detroit 34, Michigan
Telephone
FO. 6-5300

SIZES, SHAPES & GAGES OTHER THAN THOSE LISTED AVAILABLE ON REQUEST
ALLOYS OTHER THAN COMMERCIALLY PURE ALSO IN STOCK FOR DELIVERY BELOW MILL PRICES

TRADE LITERATURE

L—401. SPRAY WASH CLEANER—Sprean 66, a powdered, alkaline product for spray wash cleaning of steel, copper, brass and aluminum, has been introduced by Enthone, Inc., subsidiary of American Smelting and Refining Company. The new product is claimed to be formulated to provide maximum detergency, eliminate excessive foaming, inhibit steel parts and equipment from rusting, and prevent scale formation on spray nozzles and heating coils.

Sprean 66 is recommended for use at 2–4 oz/gal at 140 to 200F in all types of metal washing machines. It is designed to remove oils, drawing compounds, solid dirt and shop soil.

The rust inhibiting properties provide protection to cleaned steel parts during temporary storage. The degree of rust protection can be increased by adding 1/2 oz/gal of Sprean 66 to the final rinse stage of the washing machine. Literature is available.

L—402. BARREL PLATING EQUIPMENT—Modern, multi-use barrel plating equipment is catalogued in a 16 page booklet made available by the Udylite Corporation. Major plating barrel specifications augment 38 photographs and recommendations for barrel assemblies, horizontal barrel units, loading stands, storage and transfer units and final rinse units. Automatic machines, centrifugal dryers, heating and cooling coils, tank linings and rectifiers are discussed.

L—403. LIQUID-LIQUID-VAPOR DEGREASERS—Availability of a four-page illustrated brochure describing liquid-liquid-vapor degreasers has been announced by the Phillips Manufacturing Company. Bulletin 22 explains the principles of operation of liquid-liquid-vapor degreasers, then discusses the solvent cycle and the construction of the unit.

Included in the Phillips bulletin is a table of specifications to be used as a guide for specific degreasing operations.

L—404. ALUMINUM ETCH COMPOUNDS—A wide selection of aluminum etch compounds which produce a variety of etched results from coarse grain to extremely fine are fully described in Technical Data Sheets No. 109 and 109-1, five pages of recommended usage and instructions prepared by MacDermid Incorporated.

Rates of metal removal vary so that an aluminum etch compound can be selected to give any desired result, from soil removal to deep attack for chemical milling. Metex S-438, for example, has been formulated specifically for cleaning and etching aluminum simultaneously. It gives a fine grained stain finish for subsequent bright dipping, anodizing or chromating.

L—405. BLAST CLEANING BARRELS—Exclusive features found in Pangborn's standard-duty line of blast cleaning barrels is described in 16-page Bulletin No. 706. It is illustrated with diagrams and photographs, and contains brief specifications and dimensions of each of the five sizes.

L—406. POLISHING AND BUFFING—Five new descriptive catalog sheets have been announced by the Packer Machine Company.

Specifications on five different types of automatic units are offered including information on work capacity, production rates, buff heads, wheels, head adjustment, stand adjustment, motors, controls, work tables and available accessories. Machines are of the rotary indexing, continuous rotary, horizontal conveyor and straight line conveyor type.

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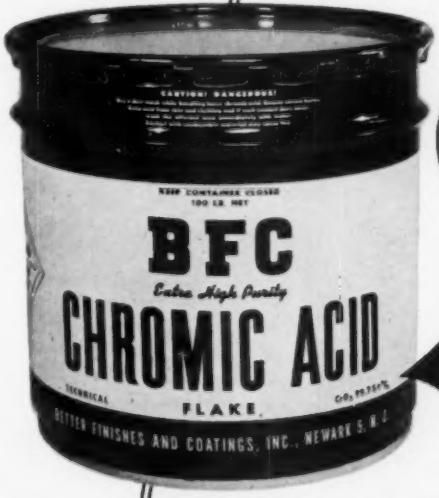

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EQUIPMENT AND SUPPLIES

E—401. ANODES—Tin-lead solder anodes of virgin metal claimed to be so pure "sludge" deposits are virtually eliminated are now available from Alpha Metals, Inc. Impurities are limited to as little as 0.02 per cent of bismuth and antimony. Other impurities are in proportionately low amounts.

Designed for plating electronic components and printed circuits, the anodes are available in extruded form. As a result, they corrode more evenly than the cast type.

E—402. EPOXY COATING—A new protective coating which it is claimed can be sprayed, rolled or brushed onto any type of surface under all weather conditions is announced by Bradco Plastics, Inc.

The new material, called PlastXcoat, has been applied to wood, plastic, concrete, brick, glass, aluminum, and even hard-to-paint transites and exotic metals. This is said to be the first time that a self-priming epoxy-based coating has been perfected for a wide variety of applications. It is available in 20 colors.

One of the features about the new self-priming coating is that it contains a built-in plastic "membrane" which eliminates the need for extra coatings usually required by conventional paints.

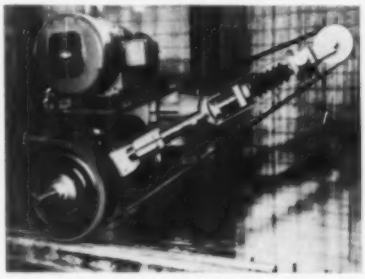
E—403. ALUMINUM COATING—The Service Products Division of Johnson's Wax has announced development of an aluminum coating to provide protection from damage by wet mortar.

The new coating, called Perma-Cote 61, also is said to give aluminum, other nonferrous metals and stainless steel "full protection against acids, alkali and outdoor exposure."

The Johnson's Wax executive described Perma-Cote 61 as a colorless, non-yellowing coating which forms a tough, glossy film that will not discolor when exposed to ultraviolet rays.

E—404. BURNISHING COMPOUND—A non-saponaceous burnishing compound said to actually safeguard steel media while producing a lustrous finish on brass, copper and nickel silver parts, has been developed by The Hubbard-Hall Chemical Company. The compound, TV-4, may also be used on silver, stainless steel and steel surfaces. Special inhibitors in TV-4 provide positive protection against pitting and corrosion of steel media. Also, with TV-4, acid pickling prior to burnishing may be eliminated except in cases of extremely severe tarnish. Oxide film and tarnish are removed from parts while they are being burnished, making acid treatment unnecessary.

E—405. ABRASIVE BELT ARM—A new Acme abrasive belt arm attachment that can be easily installed on adjustable buffing lathes of various makes to provide an economical means of adding abrasive belt polishing operations to existing equipment and to increase flexibility of production finishing operations is now available from Acme Manufacturing Company.



The light weight belt arm attachment is easily mounted on the spindle housing of buffing lathes. The belts are spring loaded between a contact wheel and an idler pulley. A spring loaded lever permits rapid and easy belt changing. Tracking of the belt is achieved through an adjustable mechanical device.

E—406. ULTRASONIC CLEANER—The diSONtegrator System Eighty, a 1½ gallon capacity ultrasonic cleaner, has been introduced by Ultrasonic Industries Inc.

The System Eighty, guaranteed for five years, features a broad band frequency modulated circuit which eliminates the need for automatic tuning as found in much higher priced equipment. The generator is rated at 120 w average power–480 w peak power output. Fused for 5 amp the generator operates from 117 v–50/60 cycle line current.

Operation is said to be as simple as that of a radio; the generator is plugged into any convenient source of 117 v–50/60 cycle current and consumes no more current than a light bulb. Cleaning begins as soon as the tank is filled with a suitable cleaning solution such as water and detergent or solvent and the switch is flipped on.

E—407. SOAK TANK CLEANER—A new compound designed expressly for the removal of heavy and tenacious soils by immersion, has been introduced by Oakite Products, Inc.

The new material, Oakite HD 126, has a *p*H of 13.5 in the recommended solution concentration. Containing no rosin or soap, the compound is said to be completely rinsable. It is said to be safe on steel, brass, and magensium; but is not recommended for use on aluminum and zinc. It is also said to have applications in barrel cleaning before plating operations, and for cleaning before vitreous enamel finishing. For most soak tank cleaning uses, recommended concentrations range from 4 to 12 oz/gal and temperature from 180 to 195F.

E—408. IMMERSION GOLD—Oromerse, a new 24 Kt neutral immersion gold, has been introduced by Technic, Inc. The new product is said to offer a fast, economical means of depositing thin plates of 24 Kt gold directly on copper, brass, nickel, iron, lead and solder plates without the use of anodes or currents. Direct deposits as thick as 70 millionths of an inch and possible over solder and it is further claimed that the deposit is extremely dense, with no variance in thickness on any area or recess reached by the solution.

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*4.8–6.2 pH	7.3– 8.7 pH
*3.6–5.0 pH	8.6–10.0 pH
*2.4–3.9 pH	10.1–11.3 pH
1.0–2.8 pH	10.5–13.0 pH
0.4–1.4 pH	11.0–13.1 pH

*Electrometric Values in Nickel Solutions.

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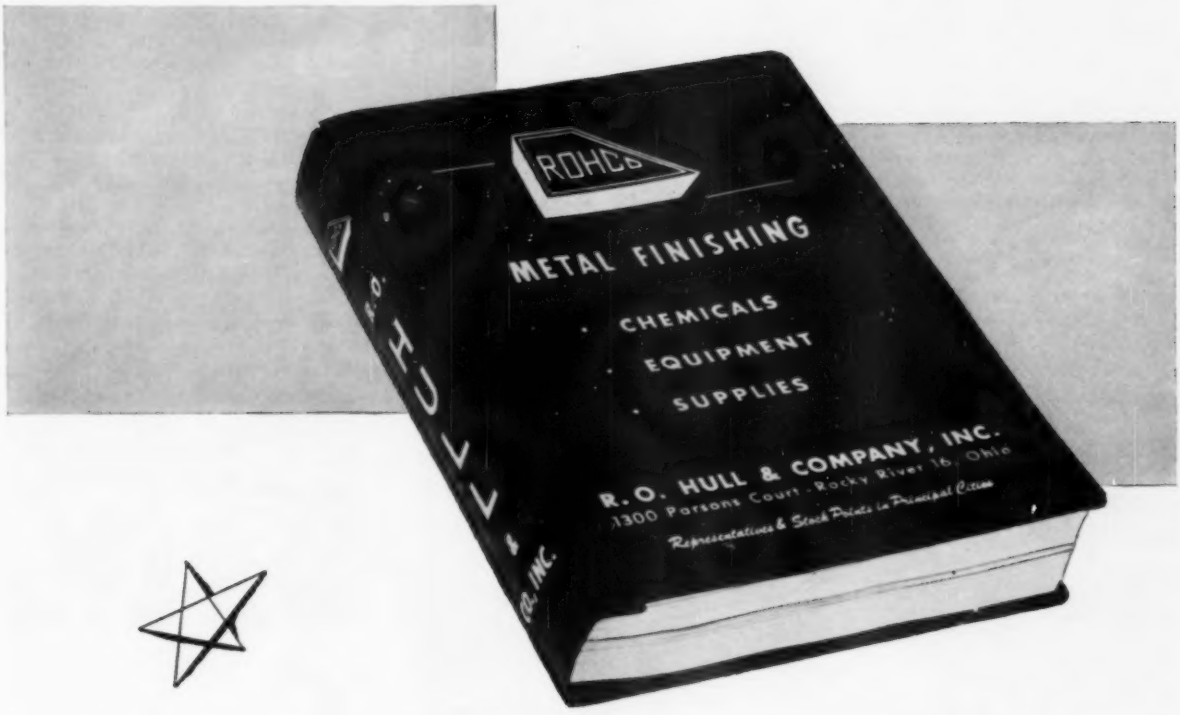
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PERSONALS

JOHN E. O'BRIEN is now New York district sales manager of Kelite Corporation. He was Philadelphia district sales manager for four years. Mr. O'Brien will have headquarters in the Kelite Berkeley Heights, N. J., facility and will oversee sales in New England, New York, and New Jersey. He is a member of the American Electroplaters' Society, Philadelphia Branch.

♦

WILLIAM J. HENNESSY is now Kelite Philadelphia district sales manager, supervising sales in Eastern Pennsylvania, Southern New Jersey, Delaware, Washington, D. C., Maryland, and Virginia. He was product development manager formerly and has been with Kelite five years. He is a member of the AES and is a Past President of the Pittsburgh Branch.

♦

CLIFFORD A. DeMERITT is now in charge of the Orlando district for Kelite which consists of the Southeastern states of North and South Carolina, Alabama, Georgia, Tennessee, and Florida. Mr. DeMeritt has been a Kelite sales engineer for four years. He, too, is a member of the AES.

♦

ROBERT F. RYAN has been named to the position of regional sales manager for the Midwestern Region of Kelite Corporation.

In addition to managing Midwestern Region sales, Mr. Ryan will co-ordinate the technical, internal control, and marketing departments at Kelite's Chicago facility where he is senior executive.

♦

J. E. O'Brien

W. J. Hennessy

C. A. DeMeritt

P. Catalanotto

♦

PETER CATALANOTTO joins Magnus Chemical Company as chemical and sales engineer.

Mr. Catalanotto is a graduate of Boys High School in Brooklyn, N. Y., and holds a BSc degree from the College of the City of New York.

Prior to joining Magnus, he held chemist positions with Magnuson Products Corporation and Chemclean Products Corporation. He also held the position of secretary with McCabe Chemical Corporation.

♦

JOHN V. BROWN has been appointed to serve the accounts of Northwest Chemical Company in the Northwest Ohio area.

Mr. Brown holds a degree in chemical engineering. In addition to academic training, he has had ten years of experience in serving chemical needs of various industries.

Mr. Brown will work from his home office at Angola, Indiana.

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Many times we have thought, jokingly, of changing our department name from, "Engineering" to "Packer Bank and Trust" . . . and with good reason, too. Our first move . . . whenever we are faced with a new engineering problem is to draw on our account . . . a series of huge engineering files with complete records on every machine, every set of tooling we have ever developed. After 27 years of continual deposits we have a healthy balance to draw on.

And this is a joint account in which all our customers share. They get their dividends in lower engineering costs and proven, practical engineering approaches to their individual tooling or machine requirements. While there is never any reluctance on our part to come up with the novel or new, a look at the bank book to check on interest-bearing deposits and withdrawals always pays off.

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In the complete line, there are compounds for fast cutting... finer finishes... tight tolerances... for steel, brass, aluminum, zinc, lead and various alloys... for hard water or soft. Ask Oakite which is the *right* one to help you get the most from *your* barrel. Bulletin F-9339 tells more. Write Oakite Products, Inc., 18 Rector Street, New York 6, N. Y.

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ROBERT G. LITTLE has been named advertising manager and director of public relations for Industrial Filter & Pump Mfg. Co.

Mr. Little joined Industrial Filter three and a half years ago, where he served successively in engineering, sales and advertising capacities. Prior to that time, he was a liaison officer between engineering and advertising in a division of United States Steel. He has also been a member of Babcock & Wilcox Company's engineering drafting staff in their Chicago office.

Mr. Little brings to his new assignment a background in industrial photography and illustration, plus training in advertising art at Chicago's Art Institute, American Academy of Art and the University of Chicago.

♦

RALPH E. SICKLES has joined Hanson-Van Winkle-Munning Company as field electrochemist. Mr. Sickles will be headquartered at the H-VW-M Cleveland office.

R. G. Little

R. E. Sickles

Prior to joining H-VW-M, Mr. Sickles had for five years been an engineer and electrochemist in the process and development section of a large rubber company. From 1952 to 1955 he was chief chemist for a far Western steel fabricator and for five years prior to 1951 he was an analytical chemist with one of the nation's largest steel companies.

A Kent University graduate, Mr. Sickles also attended Mississippi College. During World War II he served with the Army Air Force.

♦

GLEN A. SCHWEMER has been transferred by James H. Rhodes & Company to the West Coast to represent the Rhodes line of coated abrasives, buffs, etc. in the states of California, Oregon and Washington. His office will be at 2540 Huntington Drive, San Marino, California.

In the plating business for 17 years, he was formerly president of his own company, Electro Platers, Milwaukee. In 1958, he disposed of his plating equipment and became associated with the James H. Rhodes Company of Chicago, serving the territories of Wisconsin and Minnesota. He is a member of AES and a past president of the AES Milwaukee Branch.

♦

E. B. WILLEY has been named metal industries district manager of The Diversey Corporation for the Pacific Coast area.

In his new position Mr. Willey, a Diversey metal industries representative since 1953, succeeds the late C. F. Wentworth. He will make his headquarters at Diversey's South Gate, Calif. office.

♦

ROBERT J. SCHLOSSER, industrial applications engineer for the Behr-Manning Company in the Southern California area for the last ten years, has been named sales manager of the newly formed division of Crown Chemical and Engineering Company which will specialize in polishing and buffing supplies and equipment. Crown has installed fully instrumented equipment of advanced design to manufacture the Lea buffing compositions on the West Coast under exclusive license from Lea Manufacturing Company.

♦

DR. LELAND I. DOAN, president of The Dow Chemical Company, was elected a director of The Bendix Corporation at the annual Bendix stockholders meeting on February 23.

Dr. Doan attended the University of Michigan and in 1916 joined the staff of the traffic department of the Michigan Bell Telephone Company in Detroit. He joined the Dow company in 1917 and worked in research and engineering. In 1918 he was appointed to the staff of Dow's industrial chemicals sales department. He was named assistant sales manager in 1922, and general sales manager in 1929. He became director of sales in 1945.

He was named a director of Dow in 1935, a vice president in 1938, and secretary in 1941. In 1949 he was elected president of Dow.

R. J. Schlosser

D. Gray

DANIEL GRAY has been appointed special consultant on technical problems by Alpha Metals, Inc.

It was Mr. Gray's substitution of common sugar for rare and costly amino acetic acid that made indium plating a commercial practicality.

Before joining Alpha Metals, Mr. Gray was a leading research chemist with Oneida, Ltd. for 42 years. He occasionally interrupted this tenure to work on special chemical projects such as the one on indium.

In addition to being responsible for all Oneida packaging materials, Mr. Gray worked on semimicro and trace analysis development of improved methods of analysis. He particularly worked on instrumental methods.

During World War II, he introduced large scale plating of cadmium, zinc and nickel as well as unusual types of plating involving silver on aluminum, silver on molybdenum steel to withstand high temperatures, and heavy gold plate. Mr. Gray's biggest task during this period was to silver-plate airplane bearings.

A graduate of Millikin University, Mr. Gray holds some 20 patents in the fields of electrodeposition, alloys, abrasives and packaging materials. His papers on indium plating, trace impurities in silver and electropolishing have been published by The Electrochemical Society and The American Electroplaters' Society.

♦

W. C. THOMPSON has been made assistant manager of the metal industries department of The Diversey Corporation.

Since joining Diversey in 1953, Mr. Thompson has been a metal industries field representative in the Los Angeles area.

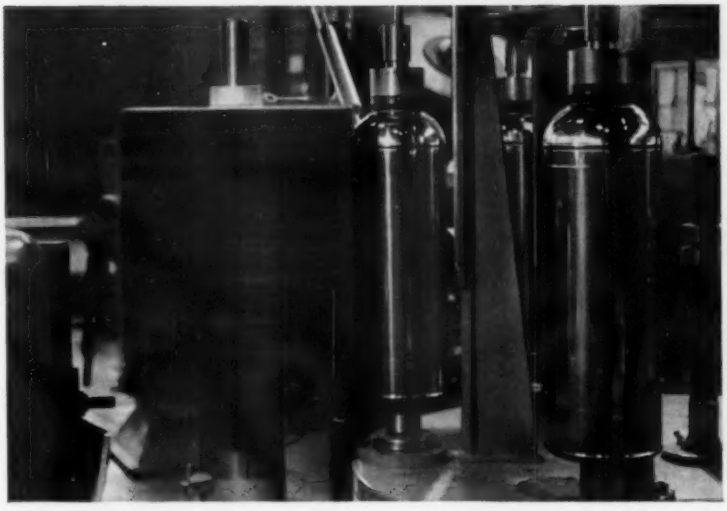
WALTER L. SACKETT

Walter L. Sackett died at his home, 30 Ownes Place, Whitesboro, N. Y., on his 65th birthday, January 26.

Born in Brooklyn, he had lived in Whitesboro for the last 13 years. For 25 years he was a representative of Oakite Products, Inc. His first wife died in 1939. He is survived by his second wife, two daughters, a sister and six grandchildren.

Mr. Sackett was a Charter Member of the AES Mohawk Valley Branch, transferring from the Syracuse Branch.

ACME IN ACTION



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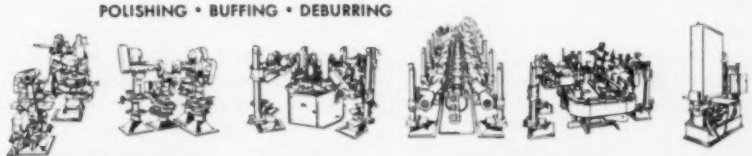

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BRANCH NEWS

Total AES Branches U. S., Canada, Australia, April 1, 1961—59.

BRITISH COLUMBIA

Bartholomew Speaks and Shows Film on Abrasives

The regular monthly meeting was held on Thursday, February 16 at the Lougheed Hotel, North Burnaby, B. C. Twenty-four members and guests attended.

Following cocktails and dinner the meeting commenced at 8:15 p.m with President **Gordon Smith** in the chair. The guest speaker of the evening was **Alex Bartholomew,** director of sales, Behr-Manning Company of Canada Ltd. Mr. Bartholomew presented a very interesting and informative discourse on the use of abrasive in job shop polishing. This was followed by a 30-minute film on the topic. A lively question and answer session succeeded.

The executive meeting of the British Columbia Branch was held on Thursday, February 23, at the new plant of Hudson Plating Co. Ltd. at 275 W. 5th Ave. Those present were **Gordon Smith, Hans Schenke, Claus Schlossareck, Jim Herford,** and **George Caslor.** A nomination committee for new executives consisting of Past Presidents **Jim Lee, Nelson Shepherd** and **Bill Margerandt** wass elected. Mr. Margerandt, program director, being absent, was substituted by Mr. Schlossareck who disclosed the guest speakers for the following two months. One new membership application was received and accepted.

Claus Schlossareck

BUFFALO

Chessin Talks on Adhesion of Plated Metals

The Buffalo Branch held its monthly meeting on Friday, February 3, at the Niagara Manor, Buffalo, N. Y. with 24 members in attendance.

President **Harold Shapiro** called the meeting to order and introduced the guest of the evening, **Ivan Kerzner.**

Branch member **Jack Martin,** who recently recovered from an ankle injury, thanked the Branch members for the basket of fruit sent him.

George Wolf, the Technical Societies representative, advised that the Buffalo Branch has been credited with three exhibition booths for the forthcoming Science Fair. Mr. Wolf asked for volunteers to contact manufacturers relative to subscribing for Science Fair booths.

Mr. Shapiro announced the May meeting will be held on the 12th due to the Empire State Regional meeting May 5 and 6.

Librarian **John Tiebor,** introduced the speaker of the evening, **Dr. Hyman Chessin** of the Van der Horst Corp. of America.

Dr. Chessin, with the aid of slides, presented a very informative talk entitled "Adhesion of Electroplated Metals."

It was followed by a question and answer period, and a rising vote of thanks for the speaker.

Robert C. Eich
Secretary

CHICAGO

Panel Discusses Hoist Line Operation

The regular meeting of the Chicago Branch was held at Petricca's Restaurant, 510 North Western Avenue on Friday, February 10. One application for membership was received and five applications were approved by the Board of Managers. **Jerry Glab,** in the absence of **Paul Glab,** read the two announcements received by the Branch. The first announcement concerned a paper to be presented at the National Convention concerning "Cost Savings Idea for Finishing." The second was that the Chicago Area Career Conference is looking for a speaker to give a paper on a topic to be chosen by the Conference Committee. There is still a need for an up-to-date roster of the members of the Chicago Branch as suggested by our librarian, **Si Gary.** The nominating committee will discuss work on the selection of officers for the new year on February 13. Si Gary introduced **Burt Allen** of McGean Chemical Company who acted as moderator for the panel of the following members: **Raymond Goodsell,** Racine Plating Company; **Tom Lazzarotto,** Specified Plating Company and **C. A. Oswald,** of Westergaard Plating Company. The subject was "Operating a Hoist Line Efficiently." Each member discussed briefly the hoist line operations used for plating in his respective plant.

Hoist lines are used on barrel plating lines and for handling rack loads. When hoists are used to move barrels and racks from one tank to another, the lifting device is engineered for the application. The number of parts which can be racked depends upon the weight limitation of the lifting device. Suitable number of rinses must be in the plating cycle to prevent contamination of solutions. The type of installation required depends upon the production goal. The installation may be a straight line tank arrangement for use with a hoist and monorail or a return "U" type arrangement. On a straight line arrangement, the loading zone will be at the beginning of the line and the unloading at the end of the plating cycle. On the "U" type the loading and unloading are located in the same area. The tanks can be arranged end to end and the work bar horizontal to the direction of travel or side by side and the work bar at right angles to direction of travel. The number of hoists on a line depends upon the number of tanks and length of line. The side by side tank positioning in a straight line requires less space between tanks. It also provides the use of a large tank with two or more plating cells, if desired, instead of a single tank per cell. The hoist line is a challenge to automatic equipment because of the greater flexibility. A lively question and answer period followed and the panel members were given a rising vote of thanks. **Jack Kerr** will speak on "Finishing of Aluminum" for the March meeting.

Christopher Marzano
Publicity Chairman

CINCINNATI

Preparation of Metals Discussed

It appears that the "group discussion type meetings" still stir up the most interest as 52 members and guests attended the February 22 meeting. After the business meeting, during which one application for membership was approved; and the nominating committee consisting of **Ezra Blount, Bill Stephenson** and **Bill Gordon** was appointed, a panel discussion was held.

The topic for the meeting was "The Preparation of Metals for Plating and Painting." The panel consisted of the following men: **Charles Dumont,** Wyandotte Chemicals Corp.; **Bill Gordon,** MacDermid Inc.; **Dick Jager,** Northwest Chemical Co.; **Dave Kaplan,** DuBois Chemicals Inc ; **Ross Lamb,** Cincinnati Cleaning & Finishing Machinery Co.; **Bill Wilson,** Pennsalt Chemicals Corp.

Bob Winston moderated the question-and-answer program during which many varied types of processing problems were discussed. The evening festivities were concluded with a social hour sponsored by Cincinnati Cleaning and Finishing Machinery Co with Ross Lamb acting as host.

David L. Kaplan

BRANCH SECRETARIES

Branch News is required of all Secretaries monthly by AES Bylaws. First of the month is Branch News deadline for next PLATING issue. Any items on hand on that date will be carried in that edition. Later arrivals will appear in the issue immediately following. In reporting talks given by speakers before the Branch, please give titles of the talks, the speakers' full identification and any other pertinent information of interest to other Branches and PLATING's broad readership.

COLUMBUS
Weisberg on Printed Circuits; Faust Honored

The Columbus Branch of the AES met at Presutti's Villa on December 2, 1960, President **McGraw** in the chair. The minutes of the November meeting were read and approved. A new member was elected. Guests present were **Carol Heiskell** and **Robert Carlson,** both of Western Electric. **Dr. Charles L. Faust** was the honored guest of the evening. He was presented with a trophy in recognition of his many achievements in the field of electroplating. President McGraw, in presenting the trophy, stated it was a privilege to have a celebrity of such distinction in the Columbus Branch.

A. M. Weisberg of Technic, Inc., spoke on cleaning and plating of printed circuits. He did an excellent job of exonorating the plater, his theme being reject the work before you plate it and get blamed for it.

Mary Fulmer
Secretary

COLUMBUS
Agitation Discussed by Saltonstall

The Columbus Branch of the AES met at Battelle Memorial Institute on January 6, President **McGraw** in the chair. The minutes of the December meeting were read and approved. **Carol Heiskell** of Western Electric was present as a guest. President McGraw commented on the activities of the Columbus Technical Council. CTC Representatives are still needed for some of the schools in this area. The annual CTC banquet will be held February 23.

Dr. Richard B. Saltonstall of the Udylite Corporation spoke on the Role of Agitation in Electroplating. Agitation functions to prevent stratification, maintain the sweeping motion at electrodes and dislodge soil. It can be useful in nearly all electroplating operations including rinsing, electropolishing, anodizing, stripping, electrolytic purification, treatment and purification of plating solutions, chemical additions as well as in most actual electroplating processes. Dr. Saltonstall also showed a movie on agitation produced by air conducting spiders in the bottom of tanks.

The meeting adjourned at 10:00 p.m. Refreshments were served, courtesy of the Globe Chemical Company.

Mary Fulmer
Secretary

DALLAS-FORT WORTH
Nobel Speaks on Brass Plating

The Dallas-Fort Worth Branch met January 18 at the Lennox Hotel, Grand Prairie, Texas, with 33 members and guests present.

After a social hour and fine dinner, the meeting was opened by President **William Aves.** Mr. Aves turned the meeting over to **E. R. Rinehart** for the drawing for door prizes. After a little confusion among the ticket holders (there being two possessors of the prize-winning ticket), both Messrs. **Hoyle** and **Miklis** won the door prizes.

Four men were accepted as new members and a former member, was reinstated.

A. C. Fricke presented **Fred H. Nobel** of Lea-Ronal, Inc., of Jamaica, New York, as the speaker of the evening. Mr. Nobel's talk on "Bright Brass Plating" covered the theory and control of bright brass plating baths. Slide projections were used to illustrate such points as the fact that increasing the concentration of the free cyanide decreases the copper content of the deposit.

Jack D. Haler
Recording Secretary

DALLAS-FORT WORTH
AES Research Project 20 Approved; Korbelak Discusses Precious Metal Plating

The February meeting was held in the Banquet Room at the Howard Johnson Turnpike Inn on Wednesday, February 15. In the absence of Branch President **Bill Aves,** away presenting a paper on Unique Inspection Methods for Ultra-High Temperature Coatings at the S.N.T. Symposium in San Antonio, Branch First Vice President **Fred Howard** presided. An enthusiastic gathering of members and guests nearly 40 enjoyed a friendly fellowship hour prior to one of the most informative meetings in a long time.

Branch business items included the voting-in of two new candidates for Branch membership and the welcoming of

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Al Jocis, a recent transfer from "Yankeeland," to our fast expanding gang. Acting President Howard called upon **E. R. Rinehart** to conduct his ever-popular "Door-prize Extravaganza." Wild eyed winners were **T. E. "Teddy" Betz, A. C. Fricke,** and ole' lucky **Ed Patterson,** a four-time winner now. The next item of business was the presentation of the Honorary Texan Award to **Al Korbelak,** who had completed two successful speaking engagements in the Lone Star State. Mr. Howard called for a vote on a new Branch treasurer. The executive board at a prior meeting had reviewed the qualifications of various candidates submitted by a nomination committee. The committee then had submitted the name of **M. A. Davison** to the membership. Voting of the Branch indicated that Milt Davison was the unanimous choice.

Secretary Fricke announced that second Vice President **D. L. "Don" Allie** was absent for good reason. Don was delegated by the Branch executive committee to attend the AES Interim Meeting in Hartford to announce the Dallas-Ft. Worth's interest in securing the 1967 National Convention.

Mr. Howard called on **M. E. Browning** to present the committee report on the Southwest Regional Activities. He gave a brief status report and announced the completion of Regional Membership Promotional Plans which have been in work for some months.

Milt Davison of the Branch AES Research Project 20 Committee reported that the Project was in the final stages of negotiation with **Dr. R. L. Hoyle,** of Arlington State University, selected as Research Fellow.

Mr. Browning reported on the Teachers Scholarship fund work being supported by the Dallas-Fort Worth Branch as part of its participation in the Dallas-Ft. Worth Council of Scientific Societies.

Two local organic finishing authorities, **A. E. Hohman** of Chance-Vought Aircraft and **O. W. Byrnes,** Convair, were introduced as visitors.

Mr. Howard introduced our guest speaker, Al Korbelak, who spoke on "New Methods in Precious Metal Plating." Mr. Korbelak presented a very informative talk dealing primarily with plating of electronic components. Some of the new techniques, especially new barrel concepts, necessary to plate multi-gang headers in great volumes were very interesting. Mr. Korbelak used slides and a sound-color movie to illustrate his presentation.

After a lively question and answer session, **Doug Cox** made a motion that the meeting be adjourned.

Jack Haler
Recording Secretary

DENVER
June Picnic Planned; Meeting Night Changed

The Denver Branch met February 9 at the Oxford Hotel. Dinner began at 7:00 p.m. and was attended by 14 members. The business meeting was opened at 8:00 o'clock by **Bob Martin,** president.

By unanimous vote it was decided to change the meeting night to the second Friday in each month. A nominating committee of **Duke Quinnell, Hubert Pahlow,** and **Haskell McAbee** was selected. After a discussion it was decided to drop plans for a dinner-dance and have a picnic in June. **Jim Jenkins** and **Robert Whyman** were added to the arrangements committee to help in planning of the picnic. The following tentative program was announced to finish out the year, a plant tour of Shwayder Brothers for March, a plant tour of Heiland Division for April, and a talk by the Turco Company on chem milling for May.

Elmer Schuster
Secretary

DETROIT
Branch Members Discuss Chromium Plating

Joseph Gurski, manager of chemical and metallurgical laboratory services of Ford Motor Company, was the technical chairman at the March 3 meeting held at the Statler Hilton Hotel. The three speakers, all members of the Detroit Branch, presented papers on various phases of chromium plating.

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"Conventional and Hi-Temperature, Hi-Ratio Chromium Plating" was the subject of the paper by **D. R. Millage,** The Udylite Corporation. **E. H. Shotwell** of the Ternstedt Division of General Motors Corporation talked on "Dual Chromium" and **Dr. E. J. Seyb Jr.** of Metal & Thermit Corporation presented "Crack-Free Chromium."

HAMILTON

Weisberg on Precious Metal Plating

Hamilton Branch of the AES heard a talk on precious metal plating on Friday, February 17 by **A. M. Weisberg** of Technic, Inc., Providence, R. I. Mr. Weisberg spoke on the latest applications and methods of precious metal plating. The meeting was held at Fischers Hotel, Hamilton, Ont.

J. G. Needham is librarian of the Hamilton Branch.

HARTFORD

Lux Discusses Preparation for Finishing

The regular Branch meeting was held at the Bond Hotel on February 20 and 39 members and guests were present. Preceding the meeting **Ruel Katz** explained how several problems were solved at his plant and this was followed by a short "trouble shooting" clinic.

The guest speaker for the evening was **Gerald A. Lux** of Oakite Products, Inc. whose subject was "Preparing Metals for Organic Finishing."

Mr. Lux stated that in the selection of materials for organic finishing the following must be considered: 1) Surface finish, 2) Type of soil, 3) How clean it must be, 4) Method to use, 5) Cost, 6) Safety to the metal, operator, etc. 7) Disposal. 8) Water-hardness, etc. Methods for preparing metals: 1) Burnoff, 2) Blasting (sand or grit), 3) Solvents, 4) Degreasers. 5) Solvent emulsion, 6) Alkaline cleaning and 7) Acidic cleaning. Performance of the cleaning method will depend on the following: 1) Concentration. 2) Temperature, 3) Agitation, 4) Time, 5) Age of solution and 6) Rinsing.

Mr. Lux then described the formation of zinc and iron phosphate coatings, the merits of each, cost, ease of operation, corrosion protection, etc.

The technical chairman for the evening was **Frank Rowley.**

Stanley Platoz
Secretary

LANCASTER

Little Talks on Nickel Plating

The regular monthly meeting of the Lancaster Branch was held at Cuzzuculi's Old Mill in Lancaster, Pennsylvania on Friday, February 10. After the president, **Paul Sharretts,** called the meeting to order, the minutes of the previous meeting and the financial statement were read and approved as read.

President Sharretts then appointed the nominating committee: **Robert Plaisted,** chairman; **Curvin Miller** and **Charles Cline.**

One application for membership was read and turned over to the board of managers for approval.

Four guests were introduced to the members. The attendance was 27 members and guests.

Following the conclusion of the business meeting, the speaker was introduced by Librarian **Joe Shockcor. Jack Little** executive vice president, Incar Inc. of Cleveland, Ohio gave an interesting talk on "Practical Aspects of Bright Nickel Plating." In his speech current trends in bright nickel plating, the pros and cons of duplex nickel plating and general practical improvements that can be made with existing processes were covered. Following a question and answer period, the members of the Branch had a chance for fellowship during which time refreshments were served.

Joe Shockcor
Acting Secretary

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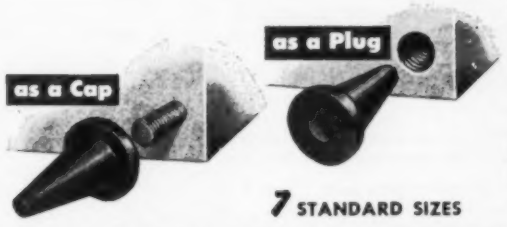

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LOUISVILLE

Process Control Presented by Jackson

The Louisville Branch held its regular monthly meeting on February 16 at the Hasenour Restaurant with 27 members and guests attending the dinner and 5 arriving for the meeting.

Herbert Rembold, president, officiated during the "streamlined" business meeting. He appointed a nominating committee to consist of **Kenneth Reifsteck, Stanley Beyer, Arthur Oertel** and himself.

Charles Whitt, treasurer, who attended the Tri-State Regional at Columbus, Ohio, reported on plans for a Tri-State Work Shop to be held in Cincinnati in October 1962. He distributed questionnaires on possible subjects requesting members to indicate their selections to guide the planning committee.

Harlan Bowsher read a letter of appreciation from **Mr. Hasenour** for our patronage.

Ken Reifsteck substituted for **Norris Shake,** librarian, and introduced **Joseph Jackson** of the R. O. Hull Co. as the speaker. Mr. Jackson's subject was "Control in Electroplating Processes" and included slides showing available equipment for titration, thickness testing, and Hull Cells. He explained the limitations of each and how the new EDTA reagent has improved the accuracy of titration for the metal constituent in cadmium, zinc, nickel, tin, copper and silver solutions. Before a Hull Cell test is conducted, chemical analysis should be made in an effort to return the solution to optimum recommended conditions. Qualitative control charts were shown and explained and descriptive literature for determining surface area of stampings and for various analysis work was made available. A question and answer period followed.

Refreshments by courtesy of suppliers were served.

Arthur A. Oertel
Recording Secretary

MIAMI

Hirsh Handles Problem Clinic

The February 17 meeting was called to order at 8:30 p.m. by **Earl Kennedy.**

M. H. Dent, librarian, gave a report on the Dixie Regional conclave held in the early part of February at Roanoke, Va. and from what we could gather it was a fine meeting but "Duke" was very happy to return to the sunny region of Florida.

The report that the Memphis-Midsouth Branch of the AES was now part of the Dixie Regional was received with enthusiasm and the warm hand of welcome is extended to them by the Miami Branch.

What with the northern weather, and other conditions, we had anticipated having one of our Problem Clinic sessions; happily enough **Stanley Hirsh** of Harstan

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Chemical, appeared and we turned over the Problem Clinic session to him.

He gave a short talk on plating with the fluoborates, which evoked a great deal of interest and instead of the usual question and answer session that follows a formal talk, we had a round table discussion with Mr. Hirsh as moderator.

It was both an enjoyable and informative evening. Collation was served.

Abe Schorr
Secretary

MISSISSIPPI VALLEY

Lux Discusses Electrocleaning; Officers Nominated

The February meeting was held Wednesday, February 15 at Prongers' Riverside Restaurant. Vice President **Wilbur McKay** opened the meeting and turned it over to Librarian **Lloyd O. Gilbert** who introduced the speaker, **Gerald A. Lux,** technical education director of Oakite Products, Inc. Mr. Lux's subject, "Some Fundamentals of Electrocleaning," covered direct and reverse electrocleaning, requirements of an electrocleaner, the action of wetting and emulsification, sequestriation and chelation, effect of *p*H, equipment and good practices. After the talk Mr. Lux answered questions.

In the business meeting which followed, the nominating committee nominated the following; President, Wilbur McKay; vice president, **Jacob Knanishu;** second vice president, **John H. Miller;** secretary-treasurer, **Clyde Shepherdson;** librarian, **Art Jackson.**

George Parisho announced that the Midwest Regional Educational Meeting will be held the last Saturday in October at the Argonne Laboratory, near Chicago. Mr. Parisho reported the results of the Interim Meeting held in Hartford.

Twenty-one members were present at the speakers dinner and 34 members and guests attended the meeting.

Clyde Shepherdson
Secretary

NEW YORK

Etching with Ammonium Persulfate Presented by Wehrfritz and Margulies

President **Joseph Rambecki** called the January 27 meeting at the Hotel Statler to order at 8:30 p.m. All the Branch officers were present.

Following recommendations of board of managers motion made and carried to accept two new members, who then were duly sworn by President Rembecki.

All banquet committees made their final reports.

Librarian **Martin Pollack** introduced **H. J. Wehrfritz** of the Becco Chemical Co. who spoke on "Etching of Printed Circuits with Ammonium Persulfate." Mr. Wehrfritz covered the various processes in use and then covered the various steps and methods such as paddle, spray and tank or immersion etching. Some of the advantages of ammonium persulfate over other methods are that various types of circuits can be etched in one system, the etchant remains clear and transparent in use, sludge formation is avoided, waste solution can be disposed of easily, copper can be recovered from the spent solution and venting of etching area is unnecessary.

Mr. Pollack then introduced **Dr. P. H. Magulies** also of Becco Chemical Co. who covered the chemical aspects of the ammonium persulfate process.

Following the question and answer period both speakers received a resounding round of applause.

Fred Saras
Recording Secretary

PHILADELPHIA

Bellinger, Weinberger, Hauseman and Goodyear Speak at Annual Meeting

The annual educational session was held in the Betsy Ross Suite of The Benjamin Franklin, Friday, March 3 at 8:10 p.m. Following a welcome to the 75 attending by Branch President Cogan, guest AES

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Third Vice President Frank O. Beuckman was introduced. Dr. Samuel Heiman, chairman of the educational session, took over the chairmanship. Dr. Heiman acknowledged the work done by Librarian Donald H. Marsh in assembling the program of speakers and pointed out the inadvertent omission of his name from the program as co-chairman of the session. The Professors Barnes and Weinberger paper on "Waste Control" was given by Dr. Leon W. Weinberger. He stated the best way to solve waste control problems was from an engineering standpoint. Important factors were: size of plant, location, land area, final disposal, drainage and fumes. The first step was to find the problem. As waste treatment is expensive, he urged the hiring of a competent man.

Dr. Weinberger showed the steps taken in analyzing the factors involved in solving the waste treatment problem of a plating plant that moved from a large city to a small town in a rural area. By the use of slides, he showed effluent analysis, rinsing, rinse water quality and water flow (as low as 12 gal/hr with counterflow and additional tanks). Treatment of the rinses was evaporation or ion exchange. Acid and alkali dumps were held to neutralize each other.

Ken Bellinger, Conversion Chemical Co., chose as his topic "Trouble Shooting in the Plating Room." He gave some practical facts in solving plating problems. Some were: water hardness, housekeeping (poor usually meant more service calls), water temperature (cold does not rinse as well as warm), condition of anode bars, different temperature levels in the tank. From a service man's viewpoint, recommendations should be made tactfully—make them so they are accepted.

The next two speakers were part of the Local Talent Panel scheduled for the December meeting and canceled due to the storm. Jack H. Goodyear, consultant, spoke briefly about "Finishing of Aluminum in Architectural Applications." The physical properties of aluminum: weight, thermal conductivity, finishability and variety of shapes, made this light metal an outstanding architectural material. Finishes available were the preliminary mill finishes, such as caustic etched and chemical brightened; oxide coatings (anodized and chemical conversion coatings); dyes, although the use of dyed anodized coatings was controversial for architectural use as color matching was a problem. Organic coatings had made great strides in the last five years, with epoxy, vinyl and acrylic based coatings replacing anodized coatings. Exposure life of from twenty to thirty years was now being talked about for these coatings.

The second panelist was Irvin K. Hauseman, First Vice President of the Branch and foreman at Pottstown Plating Works. His subject was "Quality Control." In addition to the regular chemical analysis made on 88 solutions in their plant, supplementary checks are made of temperature and Baumé on Monday, Wednesday and Friday. He gave three examples of how these readings disclosed critical changes in the solutions which would have caused trouble had they gone undiscovered until after work had been processed in them. He showed how charts kept of the relationship between Baumé and analysis were a quick means of knowing a serious change in solution composition by the Baumé reading.

Mr. Hauseman said Hull Cell tests run under shop operating conditions were important in maintaining control. Shop practices used to provide close control over quality were: good temperature controls; ampere hour meters to indicate brightener and wetting agent additions, and anode usage; dummying of bright nickel solutions for 1½ hours each morning prior to start of operations. Standard information was issued to each operator and all were trained to look for and report bad work.

On Saturday, March 4, an MFSA sponsored cocktail reception was held between 6 and 7 o'clock. This was followed by the banquet, attended by about 335, interspersed with the distribution of door prizes, an excellent floor show and dancing until 1:00 a.m.

The Branch thanks MFSA, the door prize contributors, advertisers in the program book and others who helped make this affair the success everyone said it was.

I. Wm. Marcovitch
Secretary

PHOENIX

Wilsterman Speaks on Paint; Symposium at Arizona SU

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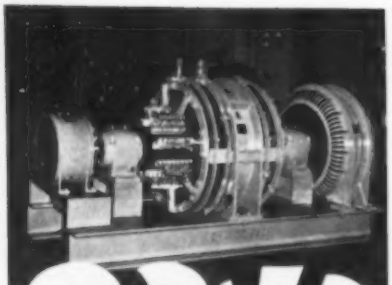

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After an excellent dinner of Chicken Coc-Au-Vin, **Floyd Huhn,** president, called the meeting to order. Two guests were welcomed, **Donald Bondi** of Enthone and **Ralph Ponce De Leon** of Motorola. **Bob Hays,** Branch librarian and Symposium Chairman, reported on the progress of our 2nd Annual Spring Symposium as follows:

The symposium will be held on the Arizona State University campus on Saturday, March 25. While subjects and speakers are not completely firmed up, the tentative schedule will be: **Morning Session:** "Copper Plating" by **Elburn Marcum** of Du Pont, "Nickel Plating" by **William Lidtke** of L H Butcher, "Chromium Plating" by **Gene Coombs** of Diamond Alkali. **Afternoon Session:** "Quality Control of Plating Processes" by **Gene Kirsch** of General Electric, "Pricing in the Plating Industry" by **Willard Bell** of Chem Research, third speaker—open.

Bob Hays introduced **Charles Wilsterman** of Deer-O-Paint Ltd. who gave a most interesting talk on Paint and Paint Processes.

Paul M. Wible
Secretary

PITTSBURGH
Blount Discusses Plating Costs

Although many social and business engagements had to be called off due to a heavy snow which fell until noon on Wednesday, February 8, about one-fourth of the Branch membership attended the meeting at Gateway Plaza that evening to hear **Ezra A. Blount,** editor of *Products Finishing*, present the subject of "Factors Affecting Job Plating Costs."

The nominating committee submitted the following slate of officers for the March election: President, **C. Forbes;** first vice president, **E. Keller;** second vice president, **E. Kost;** librarian, **W. Johnson;** secretary, **C. Mungall;** treasurer, **R. Cope.**

Four men were elected to membership in the Branch.

Clyde A. Mungall
Secretary

PORTLAND
Weekly and Bozl Present Papers

Our January meeting on the 17th had 33 in attendance, at which **Claude Weekly** of McDermid was the featured speaker. **Vern Schoenbeck,** the retiring president, passed the gavel to the new president, **Everett Cook.**

The February meeting had 41 in attendance to hear **Gene Bozl** of Alert Supply Co. speak on the physical and chemical testing of plated and applied finishes.

Last year our attendance averaged around 25 persons per meeting. The number present at the first two meetings this year show a healthy attendance increase.

Edward Elkins

ROCHESTER
Squitero on Nickel Plating; Regional Speakers Announced

The Rochester Branch held its February 6 meeting at the Rochester German Club. Various reports were given on the coming Empire State Regional Meeting and Golden Anniversary Celebration to be held at the Manger Hotel on May 5 and 6.

Frank Beuckman announced that the speakers are to be **King Ruhly,** Michigan Chrome and Chemical Company; **Scott Modjeska,** Scientific Control Laboratories; **David Miller,** Deering Milliken, Inc.

The women will be entertained at a luncheon in the Manger Hotel while the men attend the educational session.

Jack Pandina was appointed chairman of the nominating committee for the coming election of officers.

Mr. Beuckman read an invitation from the Toronto Branch to a Plating Symposium to be held by that Branch on Tuesday, March 28, at the Sea-Way Motel, Toronto.

After the business meeting, Librarian **Loring F. Carson** introduced **A. D. Squitero** of the International Nickel Company as speaker of the evening. His subject "Industrial Nickel Plating" covered the physical mechanical, and chemical properties of nickel as well as various applications of industrial nickel plating. Mr. Squitero's most interesting talk was well illustrated by several slides, some showing castings of several tons being plated outside of the plating plant because of their huge size.

Peter VanDilst
Secretary

ROCKFORD
Busy Evening in February; Murray Talks on Tarnish Prevention

A goodly crowd of 54 members and guests attended the dinner and regular meeting of the Rockford Branch held at the Faust Hotel on February 13. After the dinner, President **Harold Ellis** called for a report from the Annual Meeting Committee who assured us that this would be the very best program ever presented at our Annual and that the banquet would be something to remember. **Al Overbey,** ticket and program chairman, offered a supply of tickets for all who wanted them.

At President Ellis's request, **Leonard Weeg** reported on the recent election of officers of the Midwestern Regional Council held at Chicago on January 28. Len stressed the importance of that Regional body both as a part of the National Society and as a means of furthering the interest of the Branches through closer cooperation.

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FUTURE MEETINGS

Education is the business of AES. For National, Regional and Branch educational and other AES meetings ahead, see PLATING's section titled FUTURE MEETINGS herein.

I. M. Weiss, a welcome visitor from the Detroit Branch and a member of the National Membership Committee briefly outlined the methods necessary to maintain a steady growth of Society membership.

William Murray, manager of marketing, Enthone, Inc., the speaker of the evening, presented a very enlightening discourse on "Spotting Out and Tarnish Prevention" which he informed us was the subject of the very first Research Project of the Society in conjunction with the Bureau of Standards in 1929. He admitted, reluctantly that to date, no completely satisfactory solution to the problem has been found and that lacquering is not the final answer.

While Mr. Murray was quite adept in outlining the sources and possible treatments of spotting out problems, most of the methods advocated are beyond the realm of economical shop practices and the problem still remains. Porous basis metals, hard water conditions, atmospheric contaminations and the many other factors responsible for spotting out and tarnishing are so varied and complex that the solution for one alone is not enough. In every respect, Mr. Murray's talk was both technically informative and interesting, but, in view of the complexity of the problem and the time already devoted to its solution by all of us, we are sorry to report, little new was learned.

Alexander Alexander
Publicity Chairman

SAN DIEGO

Group Visit to Los Angeles Branch Planned

The December 15, 1960 meeting at the San Diego Hotel was opened by President **Harry Steinke** at 8:15 p.m. Each member and guest introduced himself. Correspondence read by **Nick Carter** concerned membership report, report of election of Branch officers and qualifications for permanent charter.

President Steinke appointed membership and educational committees and **George Loch** was named chairman of both committees. Discussion and listing of educational topics was made.

The board of managers will undertake employment assistance. Four new members were proposed by board and accepted.

One motion made by George Loch, seconded by **Richard DeLaCruz** and carried, the San Diego Branch will visit Los Angeles Branch in a group.

Mr. Loch discussed the educational program of West Coast Branches. He made available to members "Platers' Handbook" of the Los Angeles Branch at $3.00 each. The AES Constitution and Bylaws were distributed to members.

Walter J. Dornbusch Jr.
Secretary

SAN DIEGO

Arnold and Seymour Answer Plating Problems

The January 10 meeting was held at Calabrese's Restaurant, San Diego.

President **Harry Steinke** opened the meeting at 8:30 p.m.

The secretary read an invitation by Electrolab Printed Electronics Corp. to attend open house at their new plant.

George Loch presented **Earl Arnold** and **Dave Seymour** of L. H. Butcher Co., Los Angeles, who solicited and answered written questions on many problems.

Walter J. Dornbusch Jr.
Secretary

SPRINGFIELD

Ruhly Tells About Rack Coatings

The Springfield Branch met at Wayside Restaurant in West Springfield on February 27 for the regular monthly meeting. The business portion of the meeting was quite lengthy due to the Interim Meeting Report given by **Robert J. Girard** and **Edward R. Dupuis,** and the subsequent discussion.

A nominating committee was appointed to select and offer a slate of officers for the election to be held at the March meeting. Chairman is **Charles F. Griffin Jr.** and he will be assisted by **Edward F. Koetsch Jr.** and **Wayne B. Sanders.**

The Turkey Shoot was a social as well as a financial success. Thirty-five members and guests showed up, to compete for the door and shoot prizes. Chairman of the Activities Committee **Elery C. Gibson** informed the members that the main part of the program for the Annual Golf Outing, Installation of Officers and Banquet has been arranged. The date is Saturday, June 10, at the Whippernon Club, in Russell.

Technical Chairman **Charles F. Griffin** gave a brief background of the speaker and introduced **King Ruhly,** sales manager of the Chemicals Division of Michigan Chrome and Chemical Company, Detroit, Michigan. His subject was "Electroplating Rack Coatings and Stop-off Materials." Mr. Ruhly stressed the fact that although there are many types and qualities of stop-offs, the two most important factors are to get the right one for the particular job and condition, and then to have it used by a qualified person. The many stop-offs include lacquers, waxes, both high and low melting, tapes—both self-adherent and without a built-in adhesive masks, sheets, foils, hot melts, and

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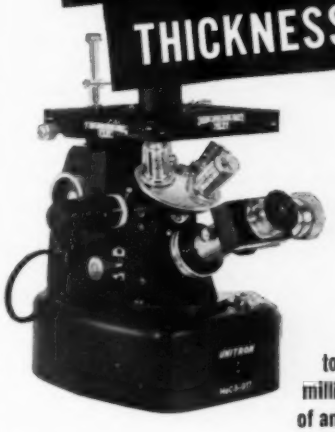

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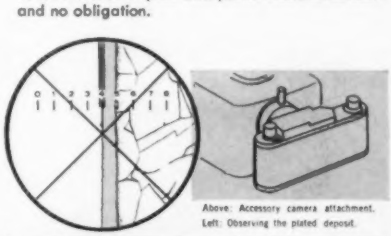

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plating and stripping process. The generally accepted rack coating is plastisol and/or its various derivatives. The talk was informative and very well delivered, and a number of questions followed.

Henry L. Heissfeld
Secretary

WATERBURY
Schneiders Speaks to Own Branch on Adhesion

The Waterbury Branch held its regular monthly meeting at the Roger Smith Elton Hotel on Thursday February 9. President **Bill Giesker** called the meeting to order and announced that **William T. Gray** will be the member to be honored at the "Old Timers Night" affair to be held in conjunction with the Interim Meeting at the Hotel Statler on February 11. A contingent of Waterbury Branch Members will attend the affair.

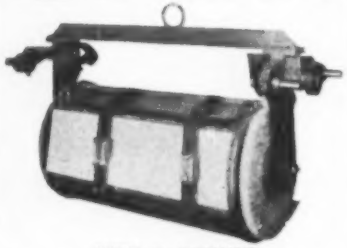
Albert Griffith, the Branch's second vice president has left the area to join the Bendix Corp., Atomic Energy Div., Kansas City, Mo. Al was secretary of the Branch for several years.

Technical Chairman **Fred DePalma** introduced the speaker of the evening, **Frank Schneiders.** Mr. Schneiders talked on "Adhesion" and covered the principals of obtaining adherent bonds in paint to metal, and metal to metal systems. There was considerable discussion after the presentation of the paper.

F. A. Schneiders
Publicity

PLATING MAGAZINE invites AES Branches to furnish news for publication in PLATING concerning electroplating courses sponsored.

Clinton



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BRANCH EDUCATION

AT BLUE RIDGE

A short school for electroplaters and metal finishers will be given at the Virginia Polytechnic Institute, Blacksburg, Virginia from August 20 to September 1, 1961. It will be held in the new wing of Randolph Hall.

Two courses will be offered. Course A will be primarily for those who have no chemistry and only limited plating experience. It will review the preparation for plating, and will cover general principles, control methods, and the electroplating of copper, nickel, chromium, cadmium, zinc, tin, lead, silver, gold and rhodium. Course B is for those who wish to pursue more advanced study or a special selected subject. It is necessary that the student have had previous training in chemistry. This course in special problems in electroplating involves choice of problem, review of previous work—publications, patents, etc.—plan of investigation and procedure, experimental investigation, preparation of report of results, conferences with the instructor.

Professor Nelson F. Murphy will be in charge of the course. Dr. Murphy is a member of the AES Educational Committee. Instructors will include invited experts in the various fields. Fee for the course is $25.

Inquiries should be addressed to Department of Chemical Engineering, Virginia Polytechnic Institute, Blacksburg, Virginia. Attention: Dr. N. F. Murphy, Research Professor.

ELECTROPLATING COURSES

BROOKLYN, N. Y.—Ft. Greene Evening High School
Louis Serota, Instructor
18-wk. course—Fee: None

CHICAGO, ILL.—Illinois Institute of Technology
J. M. Andrus, Instructor
18-wk. course—Fee: $80

CLEVELAND, OHIO—Max S. Hayes Trade School
H. Pochapsky Instructor
15-wk. course—Fee: $11

INDIANAPOLIS, IND.—Purdue University Extension
Dr. A. M. Max, Instructor
16-wk. course—Fee: $45

MONTREAL, QUE.—Polytechnique Institute
Dr. Andre Hone, Instructor
3-year course—Fee: $50

NEWARK, N. J.—Plants and Laboratories in Area
F. J. LaManna, Instructor
Allegri Tech, Inc., 141 River Rd., Nutley 10, N. J.
14-wk. course—Fee: $25

NEW HAVEN, CONN.—New Haven College
L. J. Durney, Instructor
15-wk. course—Fee: $50

PHILADELPHIA, PA.—Temple University Technical Institute
Dr. S. Heiman, Instructor
4 Semesters, each 16 wks.—Fee: $37 per Sem.

PORTLAND, OREGON—Portland State College
Dr. J. R. Mickelsen, Instructor
10-wk. course —Fee: $10

PROVIDENCE, R. I.—Central Senior High School
Omer Jette, J. Fogarty, J.Castriotta Instructors
2-year course—Fee: None

ST. LOUIS, MO.—Hadley Technical H. S.
Dr. Otto C. Klein, Instructor
16-wk. course—Fee: $10

SAN ANTONIO, TEX.—Trinity University
W. P. Wisdom, Instructor
18-wk. course—Fee: $10

SAN FRANCISCO, CAL.—Cubberly H. S., Palo Alto
William Ferry, Instructor
24-wk. course—Fee: $3 per 12wk semester

SOUTH BEND, IND.
Dr. H. J. Wiesner, Instructor

SPRINGFIELD, MASS.—Chicopee Vocational H. S.
R. J. Girard and E. F. Koetsch, Jr., Instructors
Two 12-wk. courses—Fee: None

TORONTO, ONT.—Central Technical High School
R. H. Clark, Instructor
22-wk. course—Fee: $15—non-res.
$ 5—city res.

VANCOUVER, B. C.—Vancouver Technical School
Walter Kellerman, Instructor
6-mo. course—Fee: $15

BLACKSBURG, VIRGINIA—Virginia Polytech Inst.
Professor Nelson F. Murphy, In Charge
Short course—Aug. 20 to Sept. 1, 1961—Fee $25

EVANSVILLE, IND.—Joseph B. Kushner Electroplating School
Joseph B. Kushner, Instructor, 621 S. Norman Ave.
4 mos. to 1 yr. correspondence courses—Fee: $150

SANTE FE SPRINGS, CAL.—Weiner Electroplating School
Milton Weiner, Instructor, 12631 Imperial Highway
3 courses, each 12 weeks—Fees: $30 and $40

The above listings were correct so far as could be ascertained at press time. Prospective students are urged to verify courses and fees prior to making definite plans.

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NEW HAVEN BRANCH TO HOST NEW ENGLAND REGIONAL

New England electroplaters will again assemble at the Hotel Statler-Hilton, Hartford, Connecticut on April 22, 1961, this time to participate in the Twenty-Second Annual New England Regional Meeting of the American Electroplaters' Society, which will be hosted by the New Haven Branch. Other AES Branches comprising the Regional are Bridgeport, Hartford, Springfield and Waterbury.

Harry Taylor, President of New Haven Branch, is the general chairman of the affair. The technical program will be chairmanned by Alexander R. Salmond of the Springfield Branch. Other chairmen are Walter Dyber, entertainment, Hartford Branch; William Hyatt, publicity, Bridgeport Branch; and William Giesker, advertising, Waterbury Branch.

Under the direction of Mr. and Mrs. Walter J. Dyber, chairman and chairlady of entertainment, there will be a special Bingo Party for the ladies during the technical session with Bob Boulay as master of ceremonies.

Alexander Korbelak, vice president of Sel-Rex Corporation of Nutley, New Jersey, will deliver a paper entitled "New Industrial Applications for Precious Metal Coatings."

The second speaker will be Ralph E. Pettit, technical advisor, Metal Industry Department of Diversey Corporation, Chicago, Illinois. Mr. Pettit will deliver a paper entitled "Metal Etching—Functional and Decorative."

From 4:30 to 6:30 will be cocktail time immediately followed by dining, entertainment and dancing to the music of William Glenny's orchestra.

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New Haven, Conn.

The Editor

It should be noted that the paper "The Oxidation of Cyanide-Bearing Plating Wastes by Ozone" co-authored by Dr. N. E. Sondak and me, and published in two parts in the February and March 1961 issues of Plating Magazine is an AES Research Report. The investigations on which the paper is based were completed under AES Research Project No. 10 conducted at Yale University.

(Signed) Barnett F. Dodge

AES MEMBERSHIP REPORT

ELECTIONS

Buffalo: I. Kerzner
Central Michigan: V. O. Pickens
Chicago: M. E. Kaufman, R. R. Deschamps, G. L. Wien, R. W. Crain, C. J. Novotny
Dallas-Ft. Worth: J. L. Cozart, R. L. Hoyle, W. C. McMordie Jr., J. E. McNeff, J. C. Miklis, C. F. Shaffer, J. N. Ward, H. Woodard
Denver: C. T. Michard
Detroit: J. Scanlon, G. H. Napier, A. J. Kent, R. J. McLeod
Houston: F. V. Cannata Jr., A. D. Dabney
Indianapolis: K. O. Marshall, R. L. Gaalema
Los Angeles: P. H. Grandengurg, H. M. Muncheryan, R. J. Medford, H. Rubin, H. M. Levin, M. H. Goldman
Memphis-Midsouth: J. E. Long, M. N. Greene, R. O. Mercer, G. Williams
Mississippi Valley: R. R. Palmer Jr.
Montreal: J. P. Chauvette, R. Pilon, S. Miyashita, M. Thebault, L. M. Guay, G. Panciuk
Newark: C. L. Wellington
New Haven: J. A. Miller
New York: W. G. Spiegler, P. Figari
Philadelphia: P. W. Berenato, P. Foti, A. J. Clark, J. R. Gantz, J. J. McGee, N. F. Warrington
Pittsburgh: J. L. Collins, J. A. Lupnacca, M. F. Good, A. L. Cerra
Rockford: T. Kampmier
San Diego: C. Kipers, M. Rogers, M. Vismara, J. Bates
San Francisco: R. M. Porter, D. A. Quigley, C. W. Tedford, M. D. Knight
Southeastern: A. St. Laurent
Toledo: R. H. Mullholand
Toronto: C. W. Mason, G. E. Chapman
Member-at-Large: M. A. Khan

REINSTATEMENTS

Dallas-Ft. Worth: J. H. Stacey
Houston: R. Marz
Newark: W. Duggins
New York: J. R. Young
Toronto: M. Carstenso. , R. Irwin

TRANSFERS

Chicago: F. Schnieder to Memphis-Midsouth
Dallas-Ft. Worth: A. Jocis from Bridgeport
Dayton: O. P. Catlin to Milwaukee
Detroit: J. M. Hage from Grand Rapids
Grand Rapids: J. DeLiefde to Central Michigan, J. M. Hage to Detroit
Memphis-Midsouth: L. Harrington from Member-at-Large, W. W. Tabler from Member-at-Large
Milwaukee: G. A. Scwemeroto Los Angeles
Newark: E. A. Bezursik from Hartford
New York: T. Mobile Sr. to New Haven
Seattle-Puget Sound: H. Mroch to Bridgeport, J. Tulumello to San Diego
Member-at-Large: W. W. Tabler to Memphis-Midsouth, L. Harrington to Memphis-Midsouth

RESIGNATIONS

Lancaster: A. W. Sutch
Rockford: G. A. Boles

SUSPENSIONS

Dallas-Ft. Worth: T. J. Foy Jr.
Waterbury: S. L. Doughty Jr., L. E. Lafferty, B. Lipman

DEATHS

Denver: H. A. Schoonover
Houston: M. A. Parr
Indianapolis: T. O. Evans
Mohawk Valley: W. L. Sackett
New Haven: Dr. R. Springer
Philadelphia: O. W. Mott

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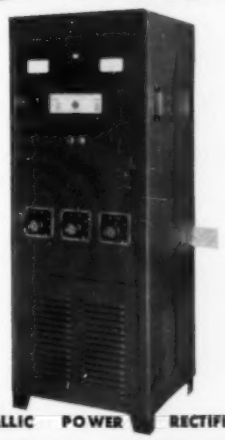

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

April 6-7, 1961—**Editorial Board Meeting,** Statler-Hilton Hotel, Detroit, Michigan.

April 8, 1961—**Los Angeles Branch,** Annual Educational Session and Dinner Dance, Statler Hilton Hotel, Los Angeles, Calif.

April 14-15, 1961—**Executive Board Meeting,** National Headquarters, Newark, N. J.

April 15, 1961—**Baltimore-Washington Branch,** Annual Banquet and Dance. Presentation of the "Order of the Pot," Park Plaza, Baltimore, Maryland.

April 22, 1961—**Twenty-Second Annual New England Regional Meeting,** Hotel Statler, Hartford, Conn.

April 24-25, 1961—**AES Research Conference,** Bell Telephone Laboratories, Murray Hill, N. J.

April 26, 1961—**Research Committee Meeting,** National Headquarters, Newark, N. J.

April 29, 1961—**Milwaukee Branch Annual Educational Session and Banquet,** Schroeder Hotel, Milwaukee, Wis.

May 2, 1961—**Central Michigan Branch Annual Educational Session and Banquet,** Hotel Hayes, Jackson, Michigan.

May 5-6, 1961—**Rochester Branch Fiftieth Anniversary Celebration Concurrently with Empire State Regional Annual Meeting,** Hotel Manger, Rochester, N. Y.

May 6, 1961—**St. Louis Branch,** Annual Banquet, Sheraton-Jefferson Hotel, St. Louis, Mo.

May 6, 1961—**Toronto Branch,** Ladies Night, King Edward Hotel, Toronto, Canada.

June 10, 1961—**Pittsburgh Branch,** Ladies' Night Dinner Dance, Churchill Valley Country Club.

June 10, 1961—**Springfield Branch,** Annual Golf Outing, Installation of Officers and Banquet, Whippernon Club, Russell, Mass.

June 18-23, 1961—**48th AES Annual Convention,** Hotel Statler, Boston, Mass.

January 13, 1962—**Ninth Interim Meeting, Supreme Society,** Hotel Marott, Indianapolis, Ind.

February 9-10, 1962—**Fourth Annual Dixie Regional Educational Meeting,** Dinkler-Plaza Hotel, Atlanta, Georgia

June 25-28, 1962—**49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.

June 24-27, 1963—50th AES Annual Convention, Ambassador Hotel, Atlantic City. N. J. Sponsorship Newark Branch.

June 15-18, 1964—51st AES Annual Convention, Sheraton-Jefferson Hotel, St. Louis, Missouri.

June 16-18, 1964—Sixth Industrial Finishing Exposition, St. Louis, Missouri.

June 28-July 1, 1965—52nd AES Annual Convention, Statler Hotel, New York, N. Y.

June 1966—53rd AES Annual Convention, Hotel Fontainebleau, Miami, Florida. Dixie Regional Council, Sponsor. Southeastern Branch, Host.

INTERSOCIETY

Apr. 30-May 4, 1961—The Electrochemical Society, Spring Meeting, Claypool Hotel, Indianapolis, Ind.

May 2-4, 1961—16th Purdue Industrial Waste Conference, Purdue Memorial Center, Purdue University, Lafayette, Ind.

May 22-26, 1961—American Society of Tool and Manufacturing Engineers, Engineering Conference and Exhibit, New York, N. Y.

May 27, 1961—Masters' Electro-Plating Association, 43rd Annual Banquet, The Plaza Hotel, New York, N. Y.

June 16-19, 1961—National Association of Metal Finishers, Annual Convention, Statler-Hilton Hotel, Boston, Mass.

June 18, 1961—Metal Finishing Suppliers' Association, Board of Trustees Meeting, Statler-Hilton Hotel, Boston, Mass.

June 19, 1961—Metal Finishing Suppliers' Association, Annual Luncheon and Meeting, Statler-Hilton, Boston, Mass.

June 25-30, 1961—American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 26-27, 1961—American Vacuum Society, 5th Annual Conference on Vacuum Metallurgy, co-sponsored by New York University, at University Heights Campus of N. Y. U.

July 31-Aug. 4, 1961—Gordon Research Conference on Electrodeposition, Tilton School, Tilton, N. H.

October 1-5, 1961—The Electrochemical Society, Fall Meeting, Hotel Statler, Detroit, Mich.

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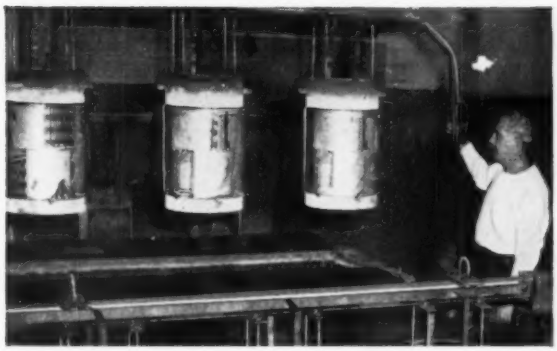

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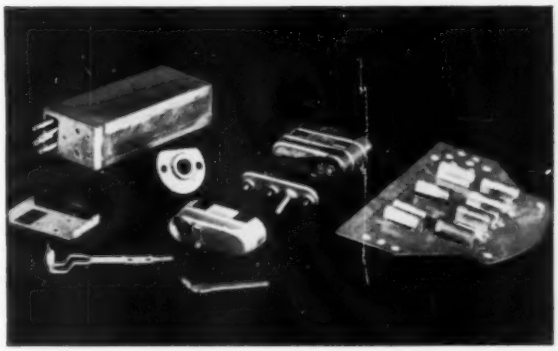

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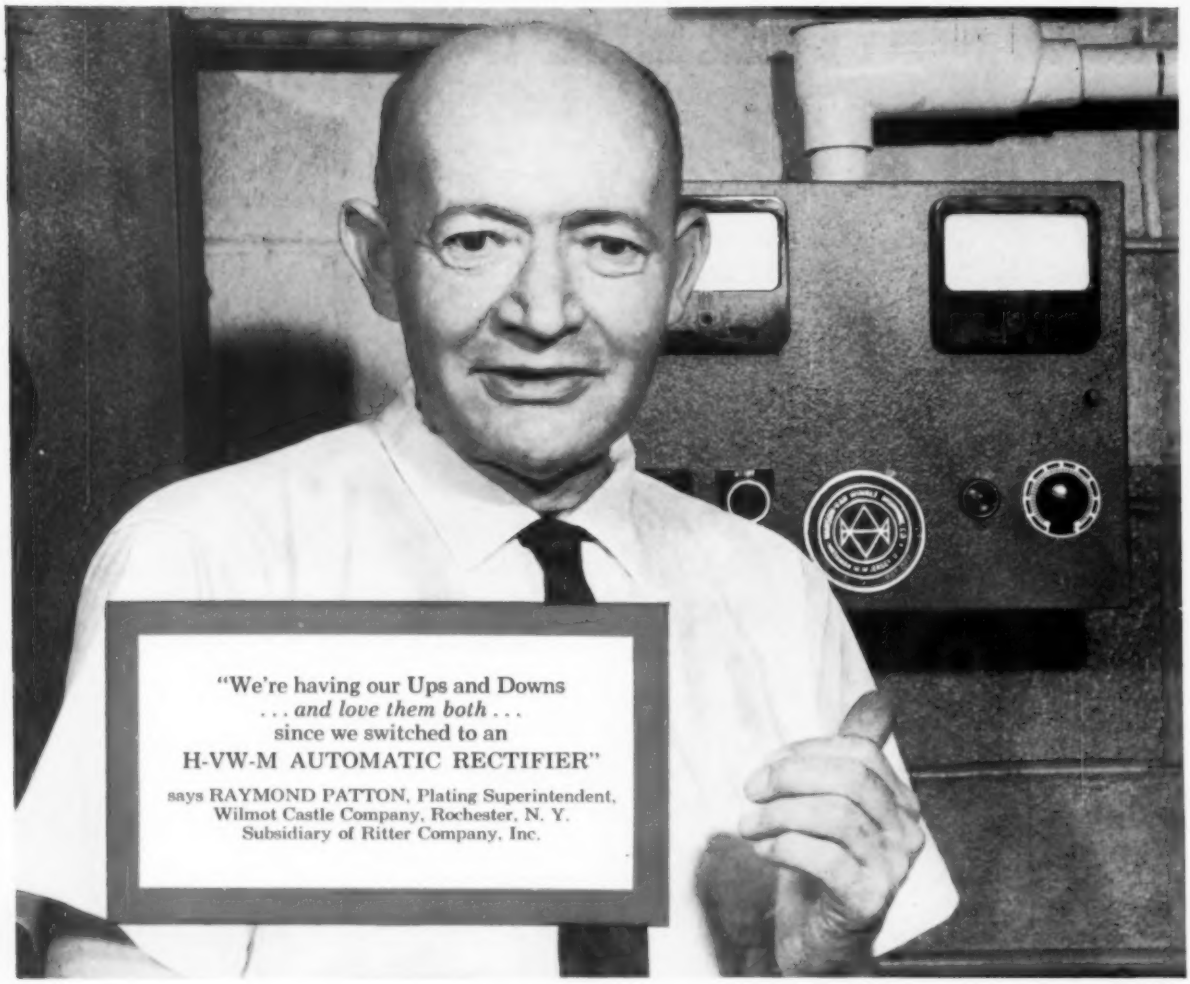
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